DMT
DANISH MYO TECHNOLOGY

DMT VESSEL ACQUISITION SUITE 6.1
(DMT VAS)
ACQUISITION

User Manual
Version 1.1

DMT VESSEL ACQUISITION SUITE 6.1
DMT VAS

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Document date: February 1, 2010
Printed: October 2010 in Milton, MAUSA

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Chapter 1 - What is Acquisition?

The DMT Vessel Acquisition Suite acquisition module provides support for data collection in DMT Vessel Acquisition Suite. There are four separate but related functions that are handled by the acquisition module:

1. One-time configuration of the physical devices attached to the computer, their attachment to each other and the options that are installed. Some examples of physical devices are: computer interface cards, excitation light sources, system interfaces and PMT tubes.

2. Definition of tasks that can be performed. Tasks fall into two groups: recording tasks such as dual excitation fluorescence and video edge detection and output/control tasks such as analog output.

3. Creation of experiments, including selection of tasks and entering of specific duration and rate (epoch) information.

4. Execution of current experiment to produce a data set, including real-time control of some experiment parameters.

Acquisition Terms

The following terms will be used to describe hardware and software that are used in the acquisition module:

Interface Card	A card that plugs into a slot inside the computer.
Computer Port	One of the “standard” ports that are usually built-in to the computer, such as serial, parallel or USB ports.
Physical Device	A generic term for a “box” that is connected to an interface card, a built-in computer port, or an other physical device by at least one cable.
Device	DMT Vessel Acquisition Suite’s representation of an interface card or a physical device. The acquisition module uses devices to perform three main functions: - Show how the interface cards and physical devices are connected to the computer and, therefore, DMT Vessel Acquisition Suite. - Specify the options that are installed in the specific physical device or the configuration options to use. For example, in a MuStep, you specify the names of the filters that are installed. - Access test functions for the interface cards or physical devices.
Hardware Tree	A hierarchical list of the devices that are used by the acquisition module.
Task	Definition of how one or more devices are used to acquire or output data or to control another device.
Task Type	General categorization which defines the overall function of a task. The task type is selected when a new task is created and it determines the values you must enter to create the task. DMT Vessel Acquisition Suite supports general purpose acquisition task types such as “Trace Recording” as well as special purpose task types such as “Dual Excitation.”
Epoch	A specified duration of time during which a specified set of task parameters will be used to “run” a task.
Experiment	A list of one or more tasks and one or more epochs plus general options that define how an experiment is run.

Chapter 2 - Manual Convention

A note icon indicates an important point that you should know.

An idea icon shows some ideas on how you can use a device or function.

A stop icon indicates a potential for personal injury, equipment damage or data loss.

Chapter 3 - Acquisition Tools

All DMT Vessel Acquisition Suite acquisition functions are accessed from the Collect menu which is divided into three sections:

The top section of the Collect menu provides access to the acquisition configuration tools:

Hardware Opens the Hardware Manager dialog which creates and manages the hardware tree by adding, configuring and testing devices.

Tasks Manager Opens the Task Manager dialog which creates and manages the list of tasks that are available for use in experiments.

Experiments Opens the Experiment Manager dialog which creates and deletes experiments and selects the current experiment.

Parameters Opens the Parameters dialog to edit parameters for the current experiment.

Trace Monitors Opens the Trace Monitors dialog to add/edit trace monitors for the current experiment.

Mark Text Opens the Mark Text dialog to edit predefined mark text available to any experiment.

Collect Menu - tools

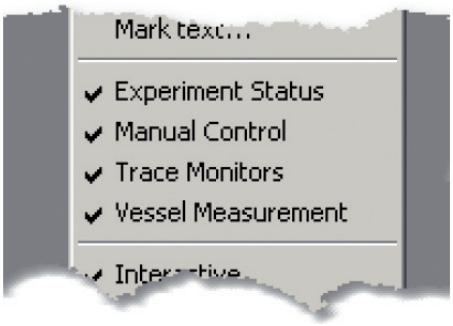
The middle section of the Collect menu allows the user to show or hide experiment tool bars available in the current experiment:

Experiment Status If checked, display the Experiment Status Tool Bar.

Manual Control If checked, display the Manual Control Tool Bar. Available depending on tasks and options selected in the current experiment parameters.

Trace Monitors If checked, display the Trace Monitors Tool Bar. Available when one or more trace monitors have been added to the current experiment.

Vessel Measurement If checked, display the Vessel Dimension Recording Task Tool Bar. Available when there is a Vessel Dimension Recording task in the current experiment.

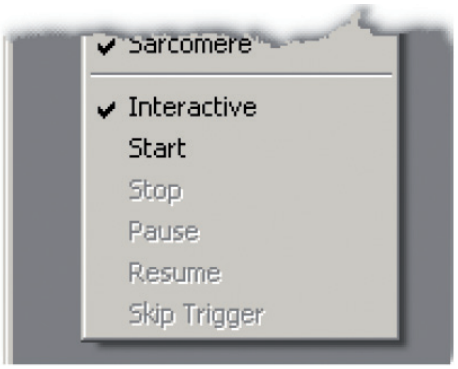


Collect Menu - Tool Bar

Additional recording task tool bars will be individually displayed for each recording task in the current experiment that has a experiment tool bar. Refer to individual recording tasks documentation for details on the tool bar functionality provided by each task.

The bottom section of the Collect menu provides tools for running the experiment:

Interactive	If checked, any visible experiment tools bars will update in real-time.
Start	Starts the current experiment, disabled once started.
Stop	Stops the current experiment, disabled unless experiment is running.
Pause	Pause a running experiment, disabled unless experiment is running.
Resume	Resume a paused experiment, disabled unless paused.
Skip Trigger	Skip wait for external trigger, disabled if not waiting.

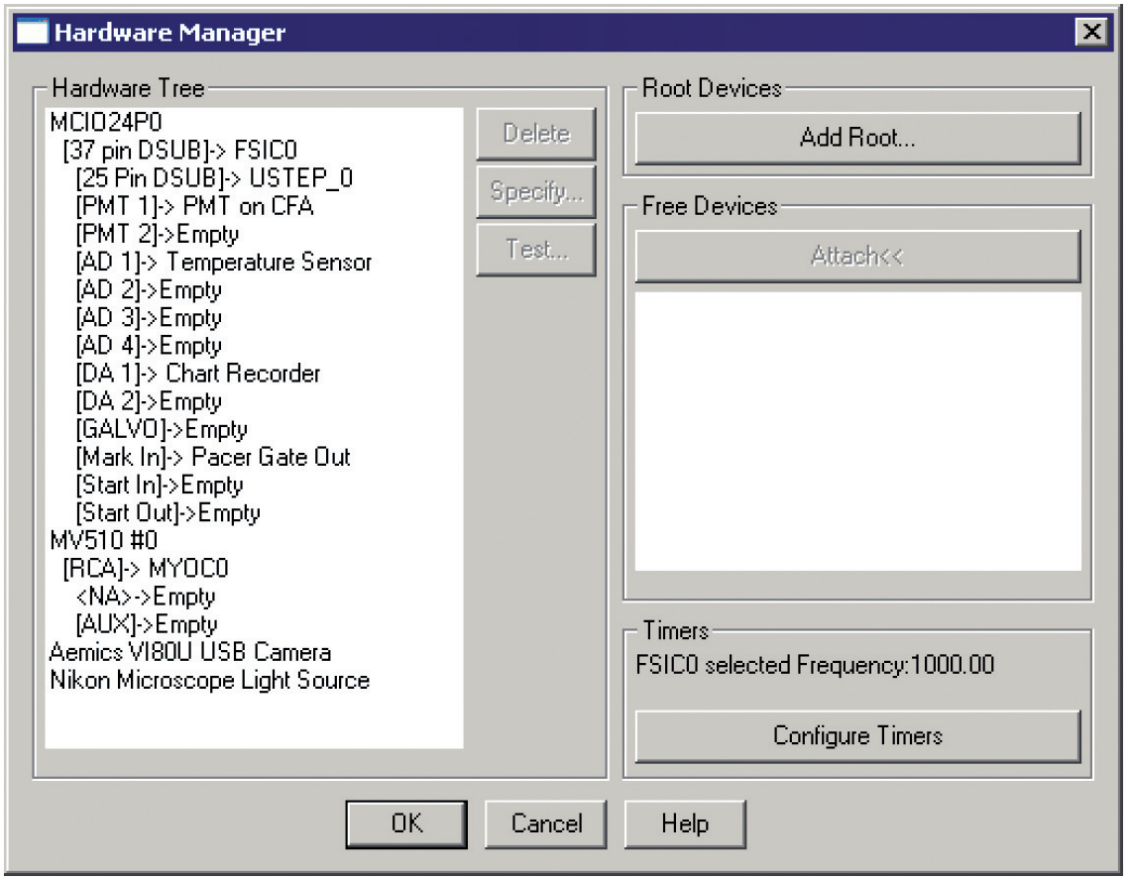


Collect Menu - Control

3.1 Hardware Manager Dialog

The Hardware Manager is used to define the hardware setup and provide hardware test functions. Setup of the Hardware Manager is the first step that should be done after software installation, as it is used by the software to determine available options for tasks and triggers. Generally, the Hardware Manager dialog will not need to be changed after the initial setup.

The Hardware Manager will generally only be edited during the initial software installation. While it is relatively easy to add devices, it can be difficult to remove devices from this tree. Once their device is added to the tree, certain physical devices, such as the camera, will need to be powered and connected for the software to start.



Hardware manager

Selecting Hardware... from the Collect menu will display the Hardware Manager dialog which provides two main functions:

1. Manages the Hardware Tree using the Add Root... and Attach<< buttons.

2. Selects the primary system timer via the Configure Timers button in the Timers section.

Managing the Hardware Tree

The hardware tree shows how devices are connected in a hierarchal tree. At the left edge are the root devices which interface directly with normal Windows device drivers. Below each device is a list of connection points that it provides. When you highlight a connection point, you will see a list of supported devices that can be attached in the Free Devices section. When you attach a device, it will be listed next to the connection point following the arrow (->) and any connections that it provides will be listed below, indented an additional level. Eventually, you will attach all the devices that will provide input to or output data from DMT Vessel Acquisition Suite.

For details on specific connections or devices, please refer to the device's documentation in the Acquisition Devices section.

Adding Root Devices

Root devices are specialized devices that connect directly to the computer and use a Windows device driver, such as interface cards and USB devices. In some cases, a root device may also be a "standin" for hardware that does not have any computer controllable parts, such as a single excitation light source. You must add the appropriate root device using the Add Root... button before you can add any non-root devices. See the Add Root Device dialog for more information.

Attaching Devices

To attach a child device to a root device or other device with connection points, select the desired connection point in the Hardware Tree and then pick a device from the Free Devices section and click the Attach<< button. The device's Specification dialog will automatically open. Please see the device of interest in the Acquisition Devices section for details about the Specification dialog.

Deleting Devices

To delete a device and any attached child devices, select the device in the Hardware Tree then click the Delete button. You will be asked to confirm that you want to delete the device.

The Hardware Manager will NOT let you save your changes if you delete a device that is used in ANY task. The delete will work but, when you click OK, you will get an error message. Your only option will be to pick Cancel (which will discard the deletes) then delete the task(s) and try again.

Specifying Device Options

Some devices have options that must be configured for the specific device. To specify the options, highlight the corresponding device in the Hardware Tree and then click the Specify... button. If the highlighted device does not have any options, the Specify... button will be disabled. The Specification dialog will also pop up automatically when adding a new device.

For details on the specify options for a specific device, refer to the "Specification Dialog" section for that device in the Acquisition Devices section.

Testing Devices

Some devices provide a test dialog that allows you to interact with the physical hardware directly from the Hardware Manager. To test the physical hardware, highlight the corresponding device in the Hardware Tree and then click the Test... button. If the highlighted device does not have a test function, the Test... button will be disabled.

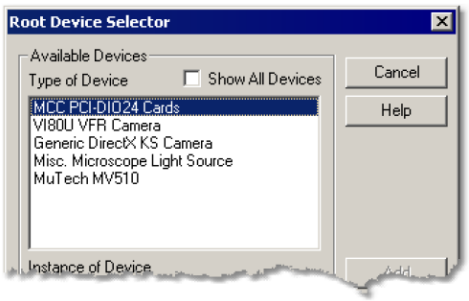
For details on the test function for a specific device, please refer to the "Test Dialog" section for that device in the Acquisition Devices section.

Configure System Timer

See the Timer Configuration dialog for instructions on selecting the system timer source.

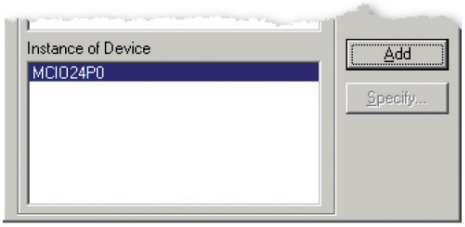
3.1.1 Add Root Device Dialog

Clicking the Add Root... button in the Hardware Manager dialog will display the Add Root Device dialog. It displays a list of all supported root devices in the Type of Device section. If you uncheck the Show All Devices checkbox, you will hide hardware devices whose required Windows device driver is not installed.



Add Root Device Dialog - Select device

After you have selected a device, you will see a list of available instances of the device. Select the instance that you want to use and then click the Add button. The device's Specification dialog will automatically open. Please see the device of interest in the Acquisition Devices section for details about the Specification dialog.



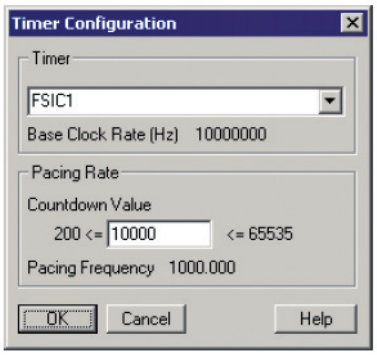
Add Root Device Dialog - Select instance

If the instance list is empty, it means that you have already installed the maximum supported number of the device type in the hardware tree.

For details on specific devices, please refer to the "Connections" section of the Acquisition Devices section.

3.1.2 Timer Configuration Dialog

The Configure Timers button of the Hardware Manager dialog will open the Timer Configuration dialog. The Timer Configuration dialog allows you to select the master interrupt source to use in the system and configure a specific pacing frequency. This pacing frequency determines that rate at which data is sampled.



Timer Configuration Dialog

Selecting Timer

The Timer drop-down menu will show all devices in your current hardware tree that are capable of being the system timer source. Generally, you should select the devices with the fastest Base Clock Rate as the system timer, which is the default selected value. In some cases, notably the System Interfaces, you must select a specific device in order for the device to function properly. Please refer to the "Requirements" section of the specific device in the[****] Acquisition Devices section for any device specific restrictions that may exist.

Once you select a timer, the Base Clock Rate and Pacing Rate section of the dialog will change based on the characteristics of the selected device.

When you change between devices, the dialog will try to adjust the countdown value so that the resulting Pacing Frequency is the same. Be sure to check that the Pacing Frequency is correct after changing the timer.

Setting Pacer Frequency

To select a specific pacing frequency, enter the correct Countdown Value to 'divide' the Base Clock Rate of the selected timer to get the desired Pacing Frequency.

$$\text{Pacing Frequency} = \frac{\text{Base Clock Rate}}{\text{Countdown Value}}$$

Consult IonOptix before using pacing frequencies greater than 1000Hz.

3.2 Task Manager Dialog

The Task Manager is used to define a collection of tasks that are available for use in one or more experiments. Tasks are created by selecting a desired task type (see § Acquisition Tasks for a list of standard acquisition task types) and then selecting the specific devices to use and entering various labels and calibration values needed to run the selected task type.

To access the Task Manager dialog select “Task Manager...” in the Collect menu or click on the Manage button in the Parameters dialog.

Some task types, such as Cell Length Recording task, are extra-cost options that may not be present on your system.

Here is a description of the parts of the Task Manager dialog:

Existing Tasks Shows the names of all currently defined tasks in the system. Click on a task to select it (highlighted with the blue bar).

Experiments Lists experiments that are using the currently selected task.

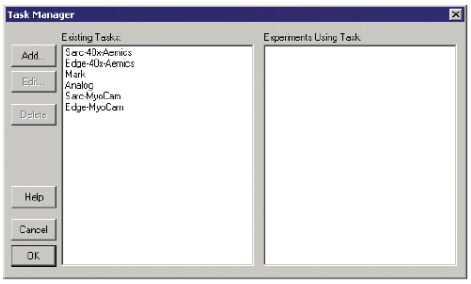
Add... Creates a new task.

Edit... Edits parameters for the currently selected task.

Delete Deletes the current task after confirmation.

Cancel Undoes ALL changes and closes dialog. Clicking the “X” in the upperright corner is the same as Cancel.

OK Saves ALL changes and closes dialog.



Task Manager Dialog

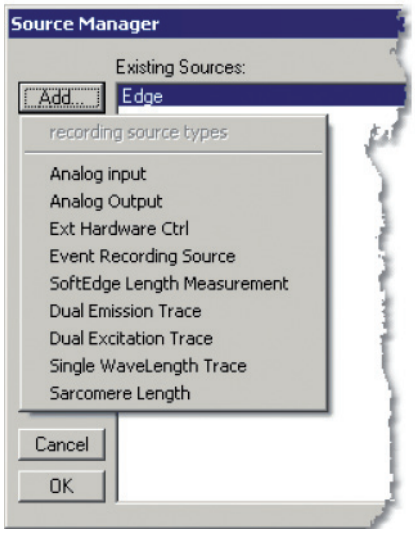
Each installed copy of DMT Vessel Acquisition Suite manages its own list of tasks.

Creating a New Task

When you click the Add... button, a list of all available task types that are installed on your system will be displayed. When you select a task type, you will be shown the corresponding ...Task dialog. The exact information that will need to be entered in the ... Task dialog depends on the task type selected - refer to the specific task documentation for details.

While the exact task parameters list varies by task type, every task has a name field. The name is displayed in the Task Manager dialog and is used when selecting a task for use in an experiment. If you define multiple tasks of the same task type, you should attempt to name each task differently so you know which task is which.

Details for the parameters are located in the ‘Task Settings section of each task type of the Acquisition Tasks section. Some task types are documented separately.



Add Recording Source List

Editing an Existing Task

When you highlight an existing task and click the Edit... button, the appropriate Task dialog will be displayed. When you edit the parameters of an existing task, you will affect any new data collected using an experiment with this task. Previously saved experiments are NOT affected by changes to a task.

If you change the name of an existing task all saved user limits and templates will be reset.

Details for the parameters are located in the 'Task Settings section of each task type of the Acquisition Tasks section. Some task types are documented separately.

Deleting a Task

To remove a task from the system, highlight the desired task then click the Delete button.

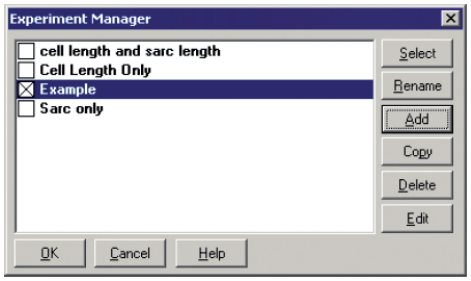
Note you can only remove a task if it is not used in any experiment.

3.3 Experiment Manager Dialog

The Experiment Manager is used to create a system-wide list of experiments and to select the current experiment. The current experiment can be edited in the Parameters dialog and run with the Start function in the Collect menu.

The main area of the Experiment Manager dialog shows a list of all experiments currently defined in the system. The blue background bar shows the highlighted experiment while the checked experiment is the current experiment that will be edited in the Parameters dialog or run with Start.

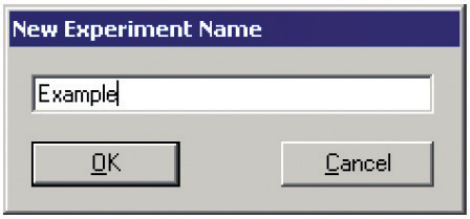
Select	Marks the currently highlighted experiment as current (moves the check box to the highlighted line).
Rename	Allows the user to change the experiment name.
Add	Adds a new experiment (see below).
Copy	Adds a new experiment with the same settings as the selected experiment.
Delete	Delete highlighted experiment, after confirmation.
Edit	Opens the Parameters dialog to allow editing of the selected experiment.
Cancel	Undo ALL changes and close dialog. Clicking the X in the upper-right corner is the same as Cancel.
OK	Save ALL changes and close dialog.



Experiment Manager Dialog

Adding a New Experiment

When you click Add in the Experiment Manager dialog, you will be asked to enter a name for your new experiment. When you click OK, the experiment will be added to the list, highlighted and made the current experiment. At this point, the Parameters dialog will be empty. Please see the Parameters section for a discussion of selecting the tasks and other options for this experiment.



Name New Experiment Dialog

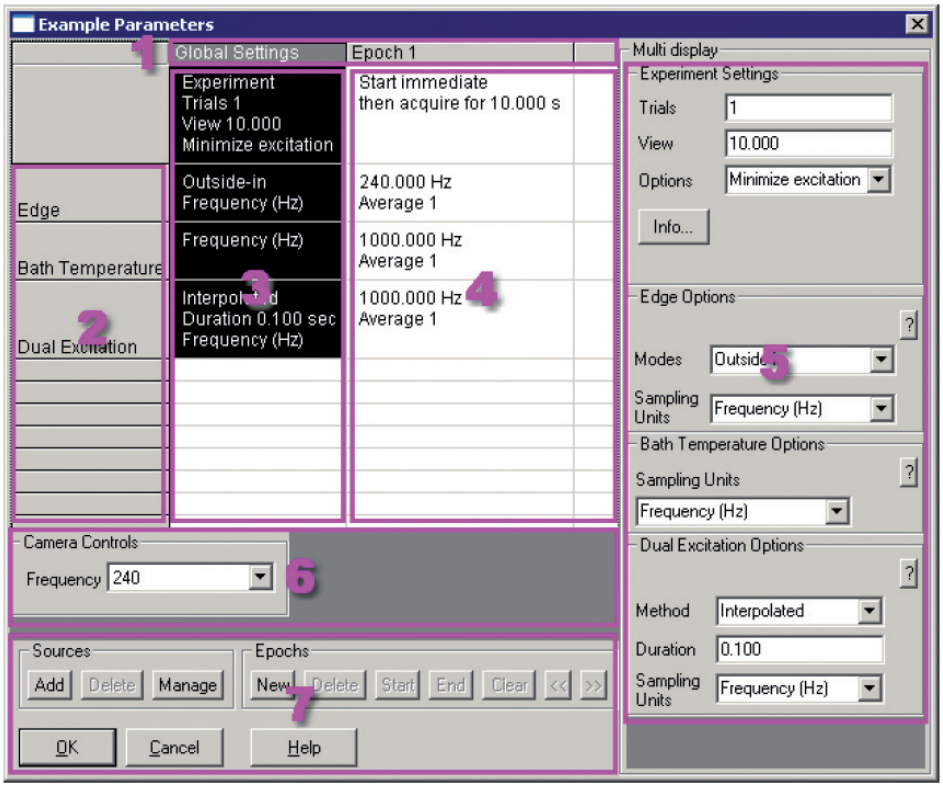
3.4 Parameters Dialog

The Parameters dialog is used to enter/edit the details of the current experiment selected in the Experiment Manager. The Parameters dialog is used to:

- Define general experiment information.
- Select specific tasks for this experiment from the list defined in the Task Manager dialog.
- Create one or more epochs that set sampling duration, rates and average parameters for each task.

Clicking the OK button saves the parameters to the selected experiment. They will be recalled the next time the experiment is selected.

To access the Parameters dialog select “Parameters...” from the Collect menu or click the Edit button in the Experiment Manager dialog.



Parameters Dialog Areas

The Parameters dialog has the following main areas:

1. Column Headings - The top gray row describes column contents.
2. Row Headings - The leftmost gray column shows the names of tasks that have been added to this experiment.
3. Experiment Settings - The first white column shows the experiment global settings in the first (unlabeled) row, followed by the experiment settings for each task.
4. Epoch Settings - The remaining white columns show settings for one or more epochs. The first (unlabeled) row displays the epoch parameters that are consistent for all tasks. The following rows display epoch settings specific to each task.
5. Edit Area - The group to the far right displays editing controls to allow you to change details associated with the currently selected column in the spread sheet.
6. Global Sensor Settings - The group just below the white columns allows you to set the sensor option to use for this experiment if required by the current tasks.

7. Control functions - The group at bottom left contains buttons used to add/delete tasks (rows), add/delete/move epochs (columns), close the Parameters dialog, cancel *ALL* changes or display help.

The Parameters dialog can be resized by dragging the lower right corner or the borders. If there are more rows and/or columns than can be displayed, scrollbars will appear to allow for scrolling through the main grid (areas #3 and #4) while the row and column headings (#1 and #2) remain to help you keep track of your position.

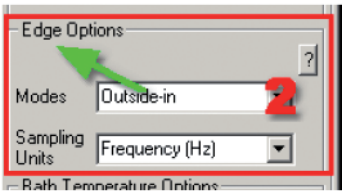
The Control Functions area (#7) contains buttons that allow you to add and remove rows (tasks) and columns (epochs) while the Edit area (#5) is used to edit values for the currently selected column (see below).

The exact contents of the Parameters dialog will vary depending on the options purchased with your system as well as the values you enter when adding and editing tasks using the task manager. The screen shots shown should be considered examples only.

The ? mini-button in the Edit area groups will display specific help for the controls in that group.

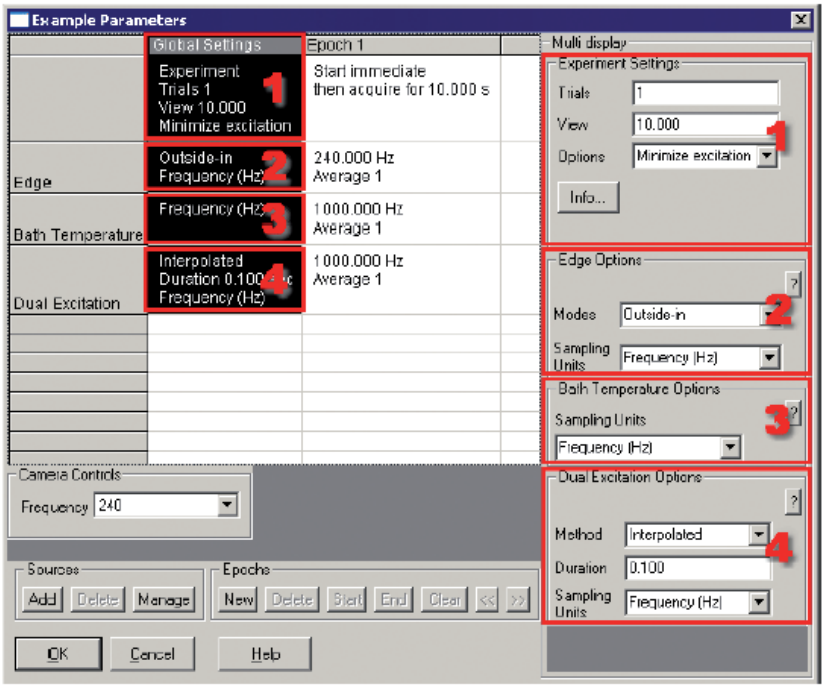
Edit Area

The Edit area is used to change any value in either the Experiment Settings or Epoch Settings columns. When you click on a column heading or a specific cell, the Edit area will display editing controls for the selected cells. For each selected cell, there will be a matching group in the Edit area which contains the input controls needed to change the values. Each group is labeled with the row heading unless it is the first row, in which case it is labeled with the column heading. In the example to the right, the group name shown by the green arrow ("Edge Options") matches the task name displayed in the row heading ("Edge").



Edit Area Group Label

Experiment Settings



Experiment Settings Column selected

The figure shows the edit area when the Experiment Settings column is selected. The indicated areas show:

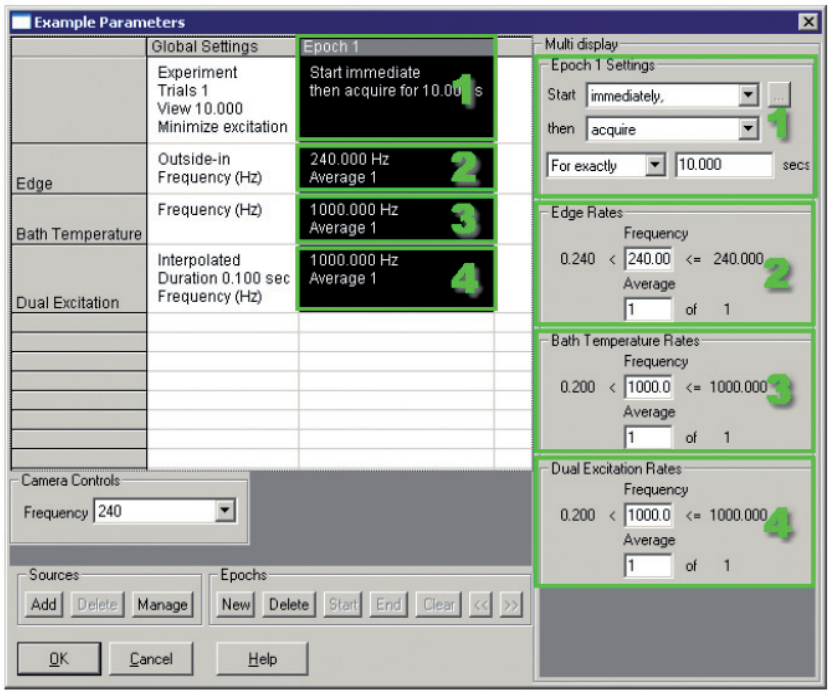
1. Experiment Global Settings: Experiment options global to all tasks in an experiment - See Experiment Global Settings for details. (the remaining items depend on the tasks in the experiment)

2. Edge Options: Experiment options for “Edge” task - See Cell Length Recording Task Experiment Settings for details.

3. Bath Temperature Options: Experiment options for “Bath Temperature” task - See Trace Recording Task Experiment Settings for details.

4. Dual Excitation Options: Experiment options for “Dual Excitation” task - Dual Excitation Trace Recording Task Experiment Settings.

Epoch Settings



Epoch Settings Column selected

The figure shows the edit area when an “Epoch Settings” column is selected. The indicated areas show:

1. Epoch start and duration settings - See Epoch Settings for details. (the remaining items depend on the tasks in the experiment)

2. Edge Options: Epoch options for “Edge” task - See Cell Length Recording Task Epoch Settings for details.

3. Bath Temperature Options: Epoch options for “Bath Temperature” task - See Trace Recording Task Epoch Settings for details.

4. Dual Excitation Options: Epoch options for “Dual Excitation” task - Dual Excitation Trace Recording Task Epoch Settings.

If all the the Edit Area groups do not fit in the Parameters dialog, a scroll bar will be displayed that will scroll the task items groups only. The top group (#1) will always display.

If you click on a specific cell, the appropriate editing group will appear in the Edit Area.

The specific controls available in the Experiment and Epoch settings for each task depends on the task type of the task. Refer to the appropriate Acquisition Tasks section for more information.

Global Sensor Settings Area

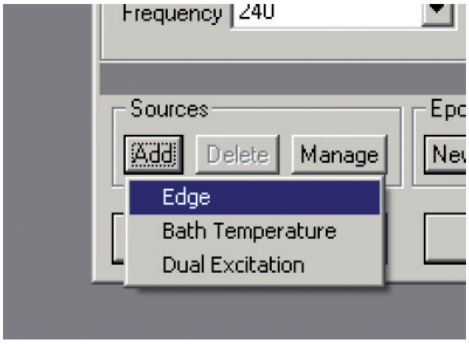
The Global Sensor Options area of the Parameters dialog contains controls for sensor options that are selected for the entire experiment. Controls will only appear in this area if one or more of the sensors selected in the task settings for any task in the current experiment have options that can be selected on an experiment-by-experiment basis. For example, the picture above shows the camera controls for the IonOptix MyoCam which allow you to select the current camera mode.

Control functions: Task Group

The Tasks group has the following functions for working with Task rows.

Add Task

When you click on the Add button in the Tasks group of the Parameters dialog, you will see a list of tasks that have been defined in the Task Manager dialog. If you select a task, it will be added to the next empty row and the Experiment Settings and Epoch Settings columns will be filled with default values. You can edit the default values by selecting the appropriate cell in the main grid then editing the values in the matching Edit Area group.



Add Task Menu

Delete Task

Clicking the Delete button in the Task group will delete the current task (row) WITHOUT confirmation. This button is grayed out if the currently selected row is not a task row (i.e. the row heading or the global settings row).

When you delete a task from the experiment you are NOT deleting it from the system. Any other experiments using the same task will not be affected.

If you accidentally delete a task, you can press the Cancel button to restore ALL parameters to their previous values.

Control functions: Epochs Group

The Epochs group has the following functions for working with Epoch columns.

New Epoch

Clicking the New button in the Epochs group of the Parameters dialog will add a copy of the currently highlighted epoch to the end of the list. If this is the first epoch it will filled with default values. You can edit the new epoch by selecting the appropriate cell in the main grid and then editing the values in the matching Edit Area group.

Delete Epochs

Clicking the Delete... button in the Epochs group of the Parameters dialog will remove the current epoch and shift any remaining epochs to the left over the deleted epoch.

Move Epochs

Clicking the << or >> buttons in the Epochs group of the Parameters dialog will move the current epoch to the left or right. When the experiment is run, epochs are run from left to right. So, moving an epoch allows you to change the order in which they are run.

Control functions: Ok, Cancel and Help

Cancel	Undo ALL changes and close dialog. Clicking the X in the upper-right corner is the same as Cancel.
Ok	Save ALL changes and close dialog.
Help	Pulls up this help dialog.

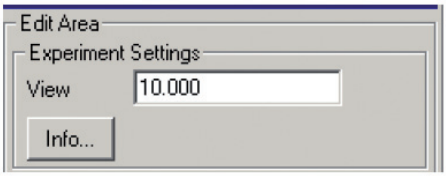
3.4.1 Experiment Global Settings

The Experiment Global Settings group appears as the top group in the Edit Area of the Parameters dialog when the Experiment Settings column, or a cell within it, is selected. The controls in this group let you select options that affect the entire experiment:

View — The View window shows the number of seconds displayed in the DMT Vessel Acquisition Suite trace viewer when the experiment is started.

Info — The Info... button pulls up the Experiment Info dialog (see below).

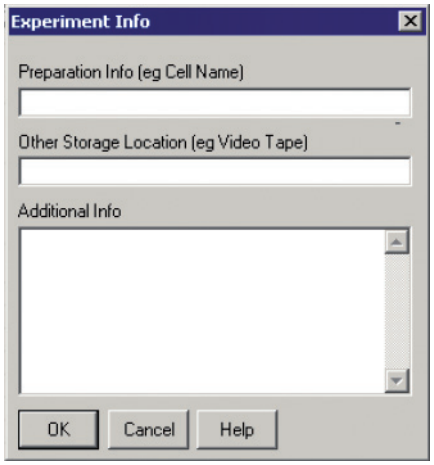
DA Delay ... — If one or more trace output tasks are part of the current experiment the Experiment Global Settings area will include a display of the current DA delay followed by a ... button that will display the DA Delay dialog (see below)



Experiment Global Settings

Experiment Info

The Experiment Info dialog allows you to enter general information about the experiment. The information is intended to be used to help you document the conditions of the experiment for easy review at a later time.



Experiment Info Dialog

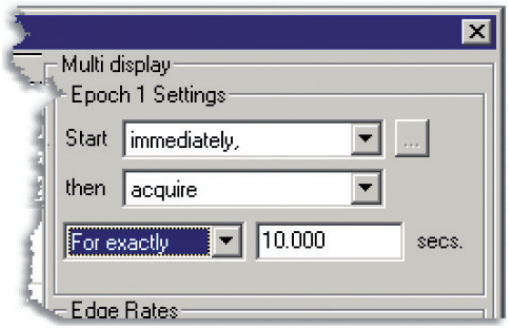
DA Delay Editor

When you click on the ... button after "DA Delay" in the Experiment Global settings area you will open the DA Delay Editor dialog. This dialog allows you to set the delay between when data started acquiring and when the value will be output to the analog output.

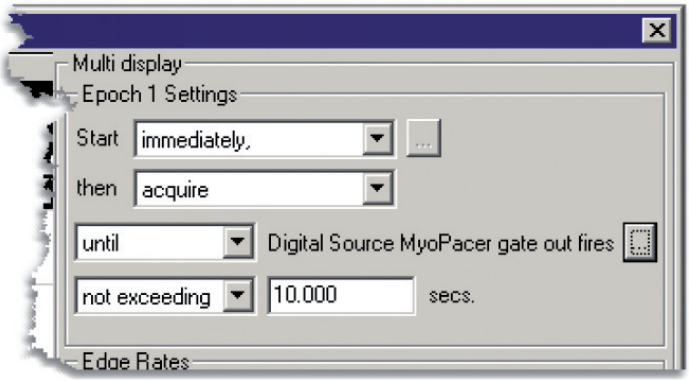
DA Delay editor

The minimum DA Delay amount is determined by the delay characteristics of the sensors selected in all trace output tasks in the current experiment. For instance, with a video camera the minimum delay is the a combination of the integration time AND the frame grabber acquisition time

3.4.2 Epoch Settings



Epoch Settings - fixed duration

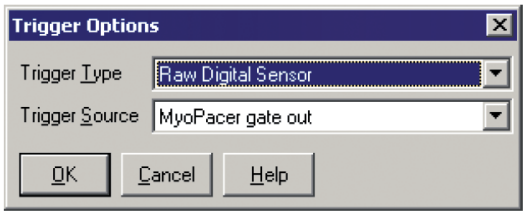


Epoch Settings - until event or duration

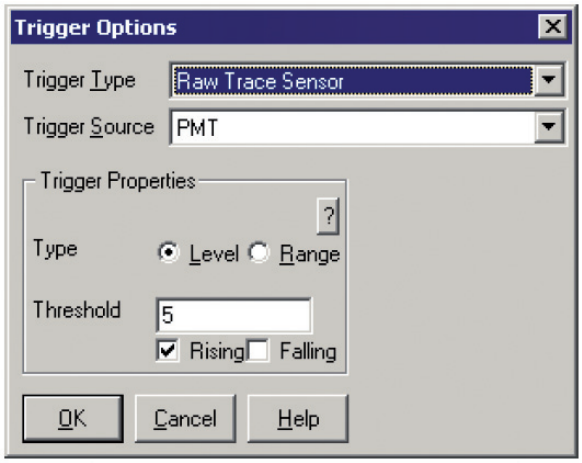
The Epoch Settings group appears as the top group in the Edit Area of the Parameters dialog when an Epoch Settings column, or any cell within it, is selected. The controls in this group let you select options that control how the selected epoch is started and when it ends.

Start	**Determines when data collection starts after the epoch is started. Options are:**
Immediately	Data collection starts immediately.
After a key press	Data collection starts after operator clicks “Click Ok to start” message box that appears when epoch starts.
After a hardware event	Data collection starts based on trigger defined with the ... button. See Trigger Options (below).
Then	**Determines what is done during this epoch. Options are:**
Acquire	Data is collected from all tasks.
Delay	No data is collected.
For Duration	
For exactly	Set duration of this epoch to the specified number of seconds.
Until	When selected, the epoch will end before the specified not exceeding time if a trigger occurs. Click the ... button to the right on this line to set up a trigger. See Trigger Options (next page).
Not exceeding	When using one or more until options, this determines the maximum duration.

3.4.2.1 Trigger Options



Epoch Trigger Options - Raw Digital Sensor

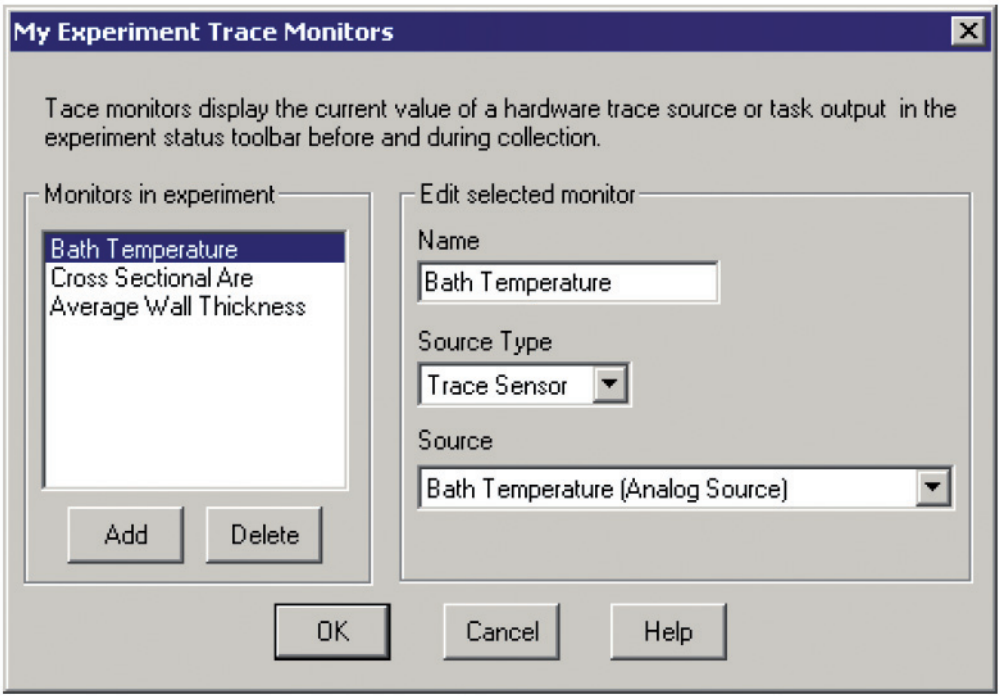


Epoch Trace Sensor - Raw Trace Sensor

Trigger options are available to start data collection for an epoch (when start=Hardware) or to end data collection (when an "until" option is selected). In either case, you access the Trigger Options dialog by clicking on the ... button in the Epoch Settings group of the Parameters dialog.

Trigger Type	Selects the trigger type that you are defining.
Raw Digital Sensor	Trigger occurs when a digital event coming from the Trigger Source is detected. Our System Interfaces define a digital event as the rising edge of a TTL pulse.
Raw Trace Sensor	Trigger occurs when the value of the raw trace selected in Trigger Source matches the level(s) set in the Trigger Properties group.
Trigger Source	Selects the device producing the digital event or raw trace that is used in the trigger. DMT Vessel Acquisition Suite will scan through the hardware tree and will list all possible hardware triggers in the drop down list.
Trigger Properties	If appropriate for the trigger type, displays options to determine how trace sensor generates triggers.
Trigger Type	Level will test the signal against a single value, and Range will test the signal against two values.
Upper Threshhold & Lower Threshold	Enter the test value in the "raw" units for the device selected in Trigger Source. When the input value "crosses" this value, a trigger will be generated if the corresponding rising/falling option is selected (see next).
Rising	Select to generate a trigger when input value goes from below to above the level entered above.
Falling	Select to generate a trigger when input value goes from above to below the level entered above.

3.5 Trace Monitors Dialog



Trace Monitors Dialog

The Trace Monitors dialog allows you to define one or more “trace monitors” that will display the current value from either a hardware trace sensor or from the output of any recording task in the current experiment. All trace monitors appear in a single Trace Monitors Tool Bar in the Experiment Tool Bars area at the bottom of the DMT Vessel Acquisition Suite window.

The Monitors in experiment group shows the list of monitors for the current experiment, allows you to select a monitor for editing in the Edit selected monitor group and add or delete monitors.

Monitors in experiment group

List Select an existing trace monitor name from the list will load the current definition into the Edit selected monitor group so that you can edit its definition.

Add Add a new trace monitor to the list that is a copy of the currently selected trace monitor. Add will be disabled if there are no trace sensors in the hardware tree and no tasks in the current experiment.

Delete Delete the currently selected trace monitor from the list.

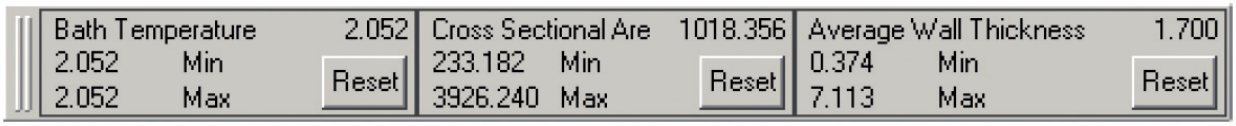
Edit selected monitor group

Name This is the name that will be used to label this trace monitor in the list and when it is displayed in the Experiment Tool Bars area. The system will set a default name as you change the Source or Source Type. Once you change the name from its default value it will no longer be changed when you change Source.

Source Type Selects between monitoring the output of a trace sensor in the Hardware Tree or the output of a a task in the current experiment.

Source List all available sources for the current Source Type. Name will be changed based on the source unless you have edited the name since the last time you changed the Source Type.

3.5.1 Trace Monitors Tool Bar



Trace Monitors Dialog

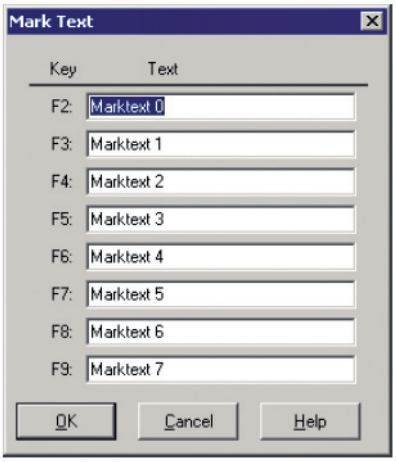
The Trace Monitors tool bar appears whenever one or more trace monitors have been added in the Trace Monitors Dialog . You may hide and show the Trace Monitors tool bar by checking and unchecking the “Trace Monitors” choice in the middle section of the Collect Menu.

3.6 Mark Text Dialog

The Mark Text dialog allows you to enter text for the mark shortcut keys that are entered using the Mark group of the Experiment Status tool bar or by pressing the corresponding function key. The mark will be added when you click the button or press the function key and will have a description that was entered for the key in the Mark Text dialog.

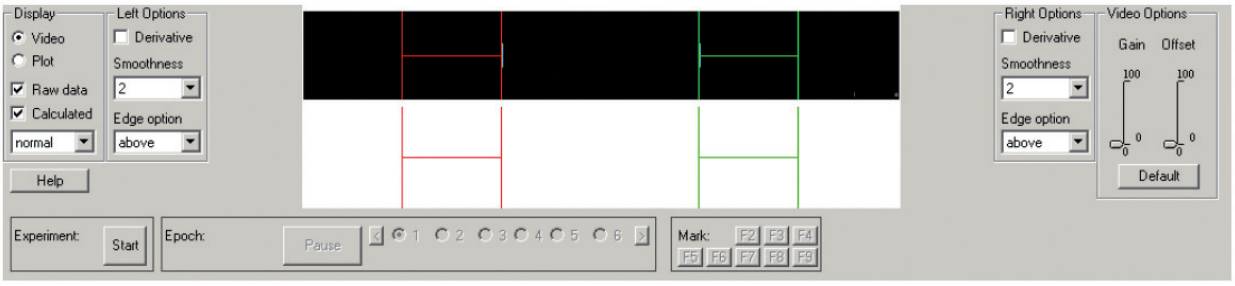
To access the Mark Text dialog select “Marks...” from the Collect menu.

Experiment Status tool bar - mark group



Mark Text Dialog

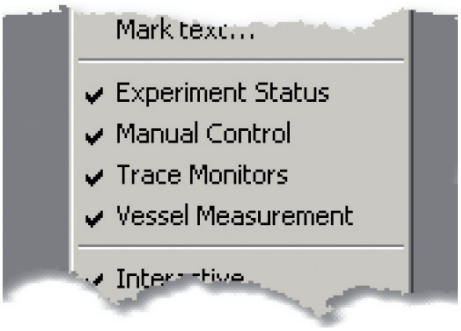
3.7 Experiment Tool Bars



Cell Length & Experiment Status Tool bars

The Experiment Tool Bar area at the bottom of the main DMT Vessel Acquisition Suite window displays one or more tool bars based on the tasks that are part of the current experiment. Every experiment will have an Experiment Status tool bar and certain tasks, such as Edge Detection, will have additional tool bars as shown in the figure above.

Tool bars can be hidden by un-checking them in the second group of controls in the Collect menu (show at right). When a tool bar is checked, it will be displayed at the bottom of the screen. Otherwise, it will be hidden.



Collect menu - Tool bars

All available tool bars are automatically displayed when you exit the Parameters dialog or change experiments in the Experiment Manager dialog.

3.7.1 Experiment Status Tool Bar

Experiment Status Tool Bar - Before Start

Experiment Status Tool Bar - While running

The Experiment Status tool bar is available in the Experiment Tool Bars area for every experiment. It appears at the bottom of the screen once the current experiment is not blank (that is has at least one task and epoch). The Experiment Status tool bar is used to provide quick access to the common experiment control functions. The three main areas of the tool bar provide the following functions:

Experiment group Start or stop the current experiment and display remaining time in experiment.

Epoch group Pause or resume an epoch, jump to epoch number n and display time remaining in current epoch.

Mark group Add mark at current time. Mark description will contain the phrase entered in Mark Text dialog.

3.7.2 Manual Control Tool Bar

Inlet Pressure Manual Control
Level 1.0000 Volts
-5.0000 <= 1.0000 <= 5.0000
Outlet Pressure Manual Control
Level 1.0000 Volts
-5.0000 <= 1.0000 <= 5.0000

Manual Control Toolbar with two manual controls

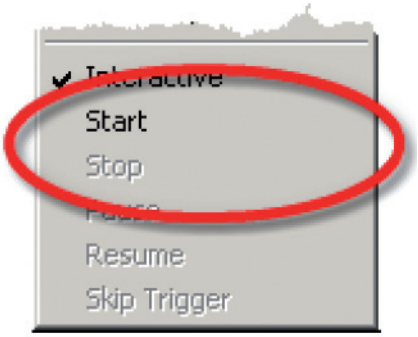
The Manual Control tool bar appears whenever one or more acquisition tasks in the current experiment provide manual control functions. For details on the operation of a specific manual control please refer to the “Manual Control” section of the appropriate acquisition task or acquisition device.

3.8 Running the Experiment

Once you have defined the current experiment parameters in the Parameters dialog, you can perform the following functions.

Start/Stop

The primary operation that you will want to perform is to start and stop your experiment. To start an experiment, either pick Start from the Collect menu or click the Start button in the Experiment Status tool bar. Once an experiment has started, it will run all the epochs defined in the Parameters dialog, unless it is stopped or paused. To stop an experiment, either pick Stop from the Collect menu or click on the Stop button in the Experiment Status tool bar.



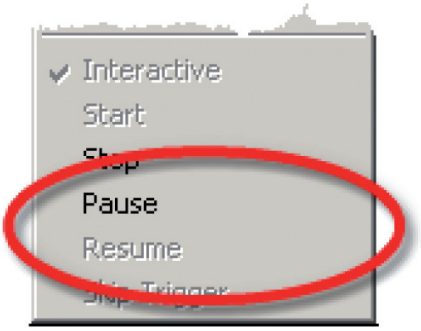
Collect menu - Start & Stop

Once an experiment has been stopped it can NOT be restarted, only saved.

Pause/Resume

While an experiment is running, you can pause the experiment by either picking Pause from the Collect menu or clicking on the Pause button in the Experiment Status tool bar.

Once an experiment is paused, you can resume the experiment by picking Resume from the Collect menu or clicking on the Resume button in the Experiment Status tool bar.



Collect menu - Pause & Resume

Changing epochs will also resume data collection.

Changing Epochs

Normally, an experiment will run epochs from left to right. You may restart any epoch by selecting it from the Epoch group in the Experiment Status tool bar.

Experiment Status Tool bar - Epoch group

Adding Marks

To enter a mark along with its accompanying text (see the Mark Text dialog), you either click on the corresponding button in the Mark group in the Experiment Status tool bar or press the indicated function key.

Experiment Status tool bar - mark group

You may also enter marks at any point in the past with the mouse. See the main DMT Vessel Acquisition Suite manual for details.

Saving/Closing

After you stop the experiment, you can can save it by picking Save from the Collect menu.

Chapter 4 - Acquisition Tasks

Before you can create an an experiment, you must define all of the tasks that you want to execute in the Task Manager dialog. To define a task, you will need to select from a list of the task types that are available. There are two main groups of task types: recording tasks and output/control tasks.

A recording task records data from one or more devices. Depending on the task type, the data will be either a collection of traces (values over time) or will be a list of events (times an event occurred). Recording tasks may also control devices as part of the recording task, such as moving a filter wheel to the correct excitation filter before reading the the emission output intensity.

Output/Control tasks output trace data to a device or provide control of a device separately from other experiment tasks.

Recording Task Types

Here is a list of common recording task types. Additional recording task types may be documented separately.

Trace	Records values from a device at the rate specified in the current epoch.
Event	Records the times that a signal is detected from a device.
Fluorescence*	Controls an excitation light source and records resulting emission brightness. Single excitation, dual excitation and dual emission are supported.
Cell Length*	Detects left and right edge of cell image from video camera and calculates resulting cell length.
Sarcomere Spacing*	Calculates average inter-sarcomere spacing from an area of a camera image.
Vessel Dimension*	Detects vessel wall characteristics from up to four areas of a camera image.
Vessel Flow Characteristics*	Multiple high-level vessel specific calculations derived from other vessel measurements.

**** These tasks are extra-cost options and may not be present on your system.***

Output/Control Task Types

Here is a list of common output/control task types. Additional output/control task types may be documented separately.

Trace Output	Outputs an analog signal reflecting data recorded by one device to another device.
Signal Generator	Provides the ability output specific values for each epoch and to optionally provide manual control.

4.1 Recording Tasks

Recording tasks are tasks that record data from one or more devices. They may also control additional devices needed for the production of the data. Recording tasks will produce one or both of the following types of data:

Trace Data	A list of values sampled over time at a fixed rate. The exact rate as well as any averaging is defined in each experiment epoch. Trace data is displayed as Value vs time graphs.
Event Data	A table of times that an event was detected. Events are recorded whenever they occur and do not have any settings in an experiment epoch. Events are displayed as “marks” along the time axis.

4.1.1 Trace Recording Task

A trace recording task records raw data values from the device selected in the Trace Recording Task dialog using the rate and averaging parameters defined in the current epoch settings.

A simple multiply/offset scaling calculation (entered in the Trace Recording Task dialog) is used to allow the raw data to be converted to the real world units of the connected device (ie temperature, pressure, etc...).

A trace recording task uses data entered in three separate places:

- Task settings - Settings that apply to all experiments using this task. Entered in the Task Manager dialog.
- Experiment settings - Settings for this task that apply to all epochs in an experiment. Entered in the Parameters dialog.
- Epoch settings - Settings for this task for a specific epoch in an experiment. Entered in the Parameters dialog.

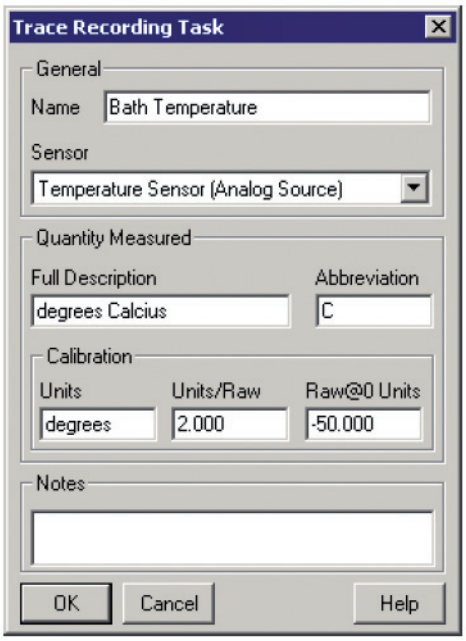
Task Output

The trace recording task produces the following output in DMT Vessel Acquisition Suite where “Name” is the description entered in the Cell length recording task dialog:

“Name-Raw” trace	Displays the actual data collected from the selected device in the appropriate units, usually volts.
“Name-Scaled” trace	Displays data that has been scaled using the multiplier and offset values entered in the Trace Recording Task dialog. The graph vertical axis will be labeled using the Full Description string from the Trace Recording Task dialog.

4.1.1.1 Task Settings

Clicking the Edit... button in the Task Manager when a Trace Recording Task is highlighted will display the task settings dialog. It has the following fields:



Trace Recording Task dialog

Name	Name this task. Name is also used as the “Type” in the Trace Viewer for data acquired using this task.
Sensor	Select the desired analog trace Task Connection from the list available in the current hardware tree. Image sensors can not be used.
Full Description	Describe the parameter being recorded (eg. “Temperature” or “Degrees C”). Used as the vertical axis label for data displayed in scaled units.
Abbreviation	Provide short hand notation of Full Description for exported table headings. Again, for a temperature probe you might enter “Temp” or “C”.
Units	Enter label for raw data trace. For analog inputs, it would be volts. For PMT, it would be counts.
Units/Raw	Provide the calibration value that converts volts to the desired units. You will probably need the manual of the device that puts out the analog signal to find this value.
Raw @0 Units	Provide the voltage at which the measurement should be zero (for example, the voltage corresponding to a temperature of 0 degrees, a pressure of 0, etc.).
Notes	Enter any notes to yourself about this recording task.

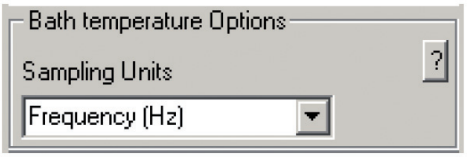
If you change the name of an existing task all saved user limits and templates will be reset.

4.1.1.2 Experiment Settings

Selecting the first column of a trace recording task row in the Parameters dialog will display the experiment settings group in the edit area. The following values can be edited:

Sampling Units Choose how you want to enter sampling rates in the epoch settings dialog.

Frequency - Enter as Hertz.
Period - Enter as seconds.



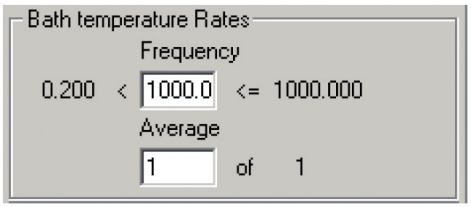
Trace Recording Task experiment settings edit area

4.1.1.3 Epoch Settings

Selecting any epoch column of a trace recording task row in the Parameters dialog will display the epoch settings group in the edit area for the selected epoch. The edit area will let you select the following values:

Frequency or Period Data sampling rate (Frequency vs Period selection is made in the experiment settings column). This is the rate at which a data point is added to the data set. This doesn't set the rate at which data is sampled from the hardware.

Average At a given frequency/period, there will be a maximum number of points (displayed as the "of n") that can be collected. Select the number of samples to average into a single raw data point.



Trace Recording Task epoch settings edit area

The minimum and maximum values for frequency or period are determined by the device capabilities and/or the current pacing frequency .

Frequency and period values are rounded to the nearest multiple of the pacing frequency when focus is moved away from the control. This effect is especially noticeable when the entered frequency approaches the maximum.

4.1.2 Event Recording Task

An event recording task records the times a specific "event" is detected during acquisition as DMT Vessel Acquisition Suite event marks. You select the type of event to record in the Event Recording Task dialog. Depending on the option selected, you may enter addition parameters that define the event in the experiment settings edit area of the Parameters dialog.

An event recording task uses data entered in two separate places:

- Task settings - Settings that apply to all experiments using this task. Entered in the Task Manager dialog.
- Experiment settings - Settings for this task that apply to all epochs in an experiment. Entered in the Parameters dialog.

Task Output

An event recording task produces a single mark for each event that is detected. The mark text is automatically set to the name of the task entered in the Event Recording Task dialog.

4.1.2.1 Task Settings

Clicking the Edit... button in the Task Manager when an Event Recording Task is highlighted will display the task settings dialog. It has the following fields:

Name Name this task.

Source Type Select type of source:

Digital Source - An event is recorded for each positive pulse from the source selected in the Source drop-down list.

Trace Source - An event is recorded each time the value read from the source selected in the Source drop-down list matches threshold/range values entered in the experiment settings group of the Parameters dialog.

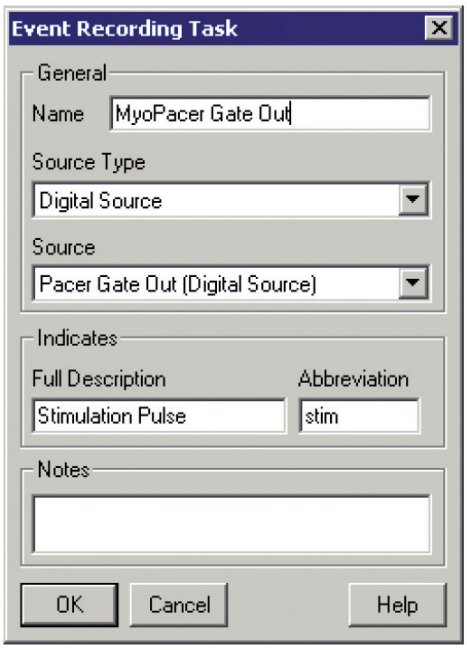
Task Trace - In this case, both the source and the threshold/range values are defined in the experiment settings group of the Parameters dialog. An event is recorded each time value in the task trace matches the threshold/range values.

Source Select the desired digital or trace source to use from a list of all that are available in the Hardware Manager.

Full Description Describe the event that is being recorded.

Abbreviation Provide short hand notation for Full Description.

Notes Enter any notes to yourself about this recording task.



Event Recording Task settings dialog

The Source drop down list is not used for the "Task Trace" source type as the trace is selected in the experiment settings group of the Parameters dialog..

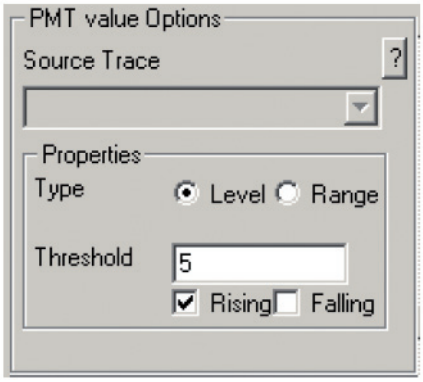
4.1.2.2 Experiment Settings

Selecting the first column of an event recording task row in the Parameters dialog will display the experiment settings group in the edit area. The values that can be edited depend upon the Source Type selected in the Event Recording Task dialog.

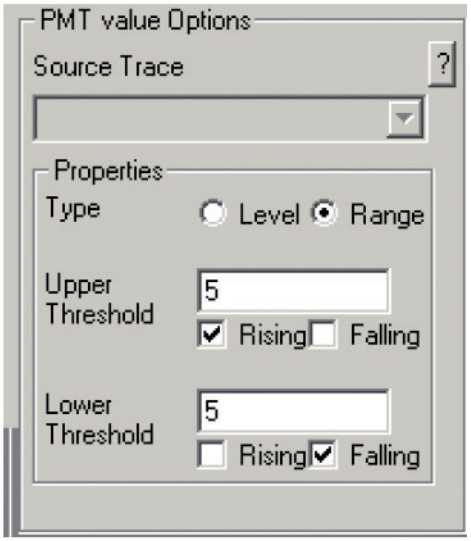
Event Type: Digital Source

There are no additional experiment settings required for the "Digital Source" source type.

Event Type: Trace Source or Task Trace



Single level threshold



Dual level threshold

For the “Trace Source” and “Task Trace” source types, you will need to specify the threshold value(s) that you would like to test to determine the event.

Type	Choose “Level” for a single threshold value. Choose “Range” for two threshold values.
Threshold	Enter the threshold level in the raw units of the sensor.
Rising	Create an event when the value of the sensor “rises” from below the threshold value to above.
Falling	Create an event when the value of the sensor “falls” from above the threshold value to below.
Source Trace	For a “Task Trace” source type, select from a drop-down list of all constructed traces in the current experiment. For a “Trace Source” source type, the control is disabled.

The specific raw sensor that is used for the “Trace Source” source type is set in the Event Recording Task dialog.

You can select Rising, Falling or both for each threshold.

4.1.3 Vessel Dimension Recording Task

The vessel dimension recording task analyzes video images to find the the characteristics of a vessel wall at up to four separate locations in the video image. The task collects raw pixel position of the left and right inner and/or outer wall positions. In addition to the raw data display, the task provides the ability to view the data in calibrated units using a user-supplied scaling factor and to perform addition calculations such as wall thickness, cross-sectional area and media/lumen ratio.

The vessel dimension recording task uses information entered in the following places:

- Task settings - Settings that apply to all experiments using this task, entered in the Task Manager dialog.
- Experiment settings - Settings for this task that apply to all epochs in an experiment, entered in the Parameters dialog.
- Epoch settings - Settings for this task for a specific epoch in an experiment, entered in the Parameters dialog.
- Global Sensor Settings Area - Experiment configuration of camera parameters for some cameras (see documentation for selected camera for details), entered in the Parameters dialog.
- Tool bar - Real-time display of images and control of cell length detection settings such as video line to analyze and the detection threshold, entered in the tool bar.

Task Options

The vessel dimension recording task experiment settings allow you to select which raw traces are collected and configure which optional calculated traces will be shown.

Task Output

The vessel dimension recording task produces the following output in DMT Vessel Acquisition Suite, where “Name” is the description entered in the Vessel Dimension Recording Task dialog:

“Name-Pixels” traces	Raw data traces collected from the selected camera device:* **Inside Left** - inside left edge pixel position **Inside Right** - inside right edge pixel position **Outside Left** - outside left edge pixel position **Outside Right** - outside right edge pixel position

"Name-Calc" traces Traces Calculated from raw data above:*

Inside Left - inside left edge position in scaled units
Inside Right - inside right edge position in scaled units
Outside Left - outside left edge position in scaled units
Outside Right - outside right edge position in scaled units
Lumen Diameter - inside diameter in scaled units
Vessel Diameter - outside diameter in scaled units
Left Wall Thickness - left wall thickness in scaled units
Right Wall Thickness - right wall thickness in scaled units
Average Wall Thickness - average wall thickness in scaled units
Cross Sectitonal Area - T.B.D.
Media/Lumen Ratio - T.B.D.

** Actual traces that you will see depend on options selected in the experiment settings .*

See DMT Vessel Acquisition Suite documentation for details on viewing traces

4.1.3.1 Task Settings

Clicking the Edit... button in the Task Manager when a Cell Length Recording Task is highlighted will display the task settings dialog. It has the following fields:

Name Name for this specific instance of the task. Also used as part of the string in the first yellow box (type) in the Trace Viewer for data acquired using this task.

Camera Select the source device for the transmitted light images to be analyzed.

Full Description Describe the parameter being recorded (eg "Length"). Used as the vertical axis label for data displayed in scaled units.

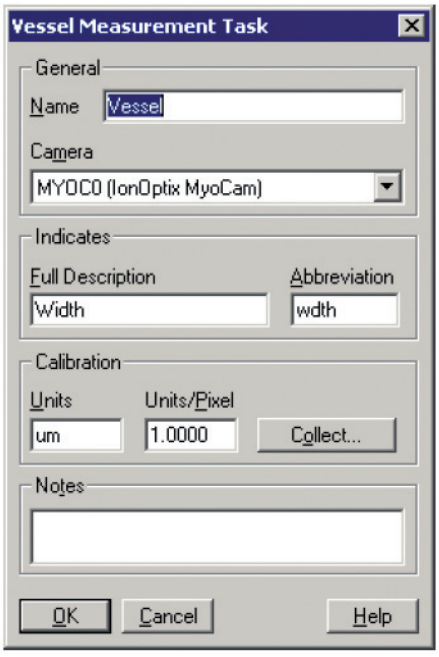
Abbreviation Provide short hand notation for Full Description for exported table headings.

Units Provide name of units for scaled length traces.

Units/Pixel Provide Scale factor used to convert from pixels to units.

Collect... Run the Video Calibration dialog to automatically calculate the Units/Pixels from live video.

Notes Enter any notes to yourself about this recording task.



Vessel dimension recording task settings dialog

Depending on the camera type selected, additional camera options for this task may be selected in the Global Sensor Settings Area of the Parameters Dialog.

If you change the name of an existing task all saved user limits and templates will be reset.

4.1.3.2 Experiment Settings

Selecting the first column of a cell length recording task row in the Parameters dialog will display the experiment settings group in the edit area. The following fields can be edited:

Zones — Select the number of separate vessel measurements to collect (1-4)

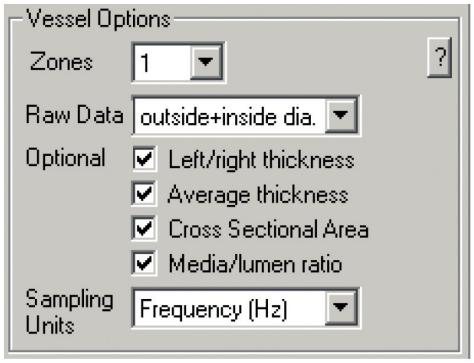
Raw Data — Select what raw data traces you would like to collect:

inside diameter - collect left and right inside position
outside diameter - collect left and right outside position
outside+inside dia. - collects both

Optional — If you select "outside+inside dia" in the Raw Data option you can also select which additional calculated traces will be available.

Left/right thickness - calculates thickness of left and right walls.
Average thickness - calculates average of left/right thickness.
Cross Sectional Area - calculates the area the vessel wall.
Media/lumen ratio - calculates ratio of the outer (media) and inner (lumen) ratio

Sampling Units — Chose how you want to enter sampling rates in the epoch settings dialog.
Frequency - Enter as Hertz.



Vessel Dimension Recording Task experiment settings edit area

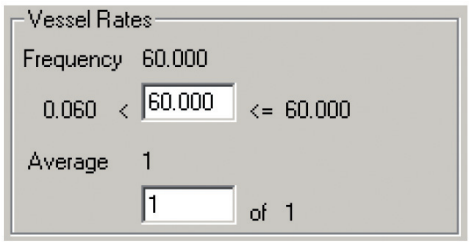
4.1.3.3 Epoch Settings

Selecting any epoch column of a vessel dimension recording task row in the Parameters dialog will display epoch settings group in the edit area for the selected epoch. The edit area will let you select the following values:

Frequency — Sampling frequency. (if "Frequency" selected in the experiment settings column)

Period — Sampling period. (if "Period" selected in the experiment settings column - not pictured)

Average — At a given frequency/period there will be a maximum number of points (displayed as the "of n") that can be collected. Select the number of samples to average into a single raw data point.

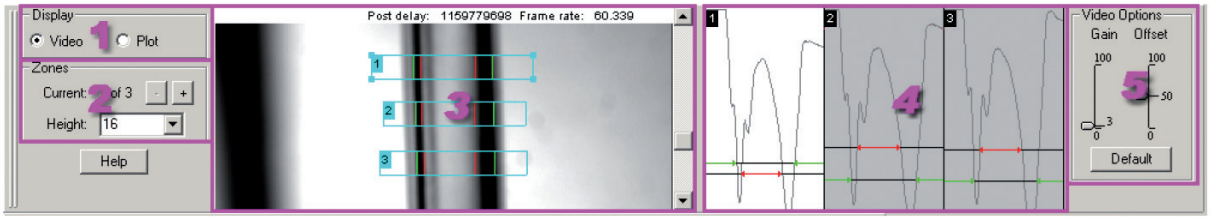


Vessel dimension recording task gobal settings edit area

The minimum and maximum values for frequency or period are determined by the camera capabilities and settings.

Frequency and period values are rounded to the nearest multiple of the pacer frequency and displayed above the input box. When focus is moved away from the control this value is moved into the input control.

4.1.3.4 Tool Bar



Vessel Dimension Recording Task Tool Bar

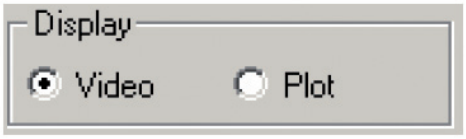
The Vessel Dimension Recording Task tool bar provides an on-screen mechanism for visualizing the image that is being analyzed, to set dynamic detection options and to visually verify the detection results. It has the following main areas:

1. Display options - Determines what is displayed in main area (#3) of the Vessel Dimension Recording Task tool bar.
2. Zone control - Select current zone or set specific height of current zone
3. Video/plot area - Display live video with zone controls or a live plot of current zone.
4. Zone graphs/thresholds - Displays graphs of video data in each zone and control for inside and/or outside thresholds.
5. Video options - Adjust parameters for current camera device selected in task settings, if any.

Display Options

Video Display live images and zone position controls in the video/plot area (#3).

Plot Display the position of all edges for the current zone in the video/plot area (#3).



Display options

Zones Options

Current Use the plus and minus buttons to move between zones, if there are more than one.

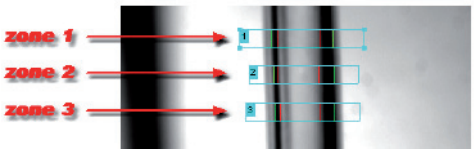
Height Select a specific height for the current zone.

Zones

All lines in a zone are averaged to create the intensity trace used to scan for the wall locations. More lines will lessen the effect of artifacts such as blood and fat within the zone.

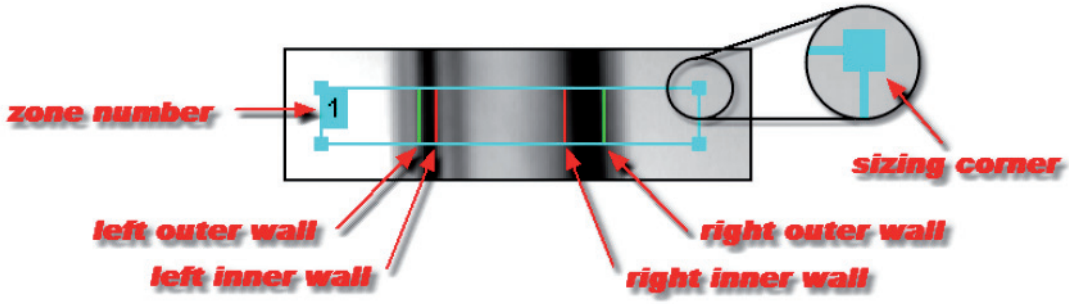
Video/Plot Area

When “video” is selected in the Display Options group, a live video image will be displayed with one to four zone controls. The exact number of zones that are available is set in the task Experiment Settings. Each zone consists of a cyan box that indicates the area of the image that is being used to calculate the vessel dimensions.



Zone controls

In addition to the zone border there are the following addition elements:



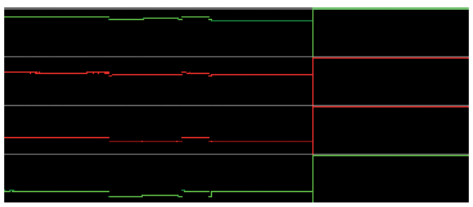
Zone control elements

Sizing corners - For the current zone only there are small boxes drawn on each corner of the zone border. These indicate that the zone can be resized by grabbing those boxes or the actual border lines of the zone. When you move the cursor over a sizing element the cursor will change into a twoheaded arrow.

Zone number - The zone number is displayed in a solid cyan box in anchored to the upper-left corner of the control. If the height of the zone is small the box may extend below the border of the zone so that the entire number can be read.

Detected wall positions - The current inner and outer wall positions are indicated by red and green vertical lines that move within the zone rectangle. The green lines show the position of the outer walls and the red lines show the inner walls. You can select whether the inner, outer or both inner and outer positions are calculate in the task Experiment Settings.

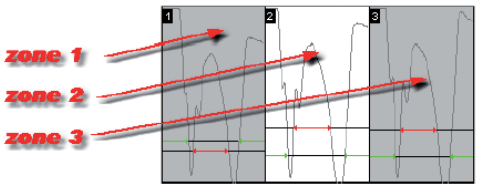
When “plot” is selected in the Display Options group, a oscilloscope-like plot of the all wall positions in the current zone. This function allows the user to preview trace data and ensure that it looks good before starting the experiment. The vertical indicates the current data location and moves left-to-right every 5 seconds. The number of plots displayed is dependent on Raw Data option selected in the task Experiment Settings - Two plots will be displayed for inside or outside only and four plots will be displayed for inside+outside. The order of the plots from top to bottom is left outside, left inside, right inside, right outside.



Plot display

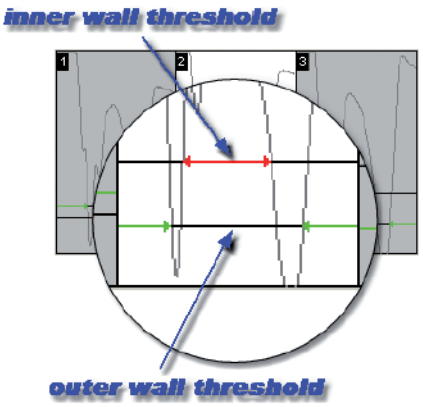
Zone Graph/Threshold Area

The Zone Graph/Threshold area displays a graph of the average intensity of all lines in each zone along with inner and outer threshold levels controls. The threshold controls allow you to tune where the vessel walls are “found” by the detection algorithm. The current zone, as set in the Zone Control area, is drawn with a white background while the others are drawn in gray.



Graph display

The results of the detection algorithm are displayed on the corresponding threshold lines. For the outer wall the “outside” parts of the lines are drawn in green and for the inside wall the “inside” of the line is drawn in red. In addition there are small arrow heads that point in the direction the line was scanned. The tips of the arrows will point to the video intensity trace at the point where it crosses the threshold where the edge was found.

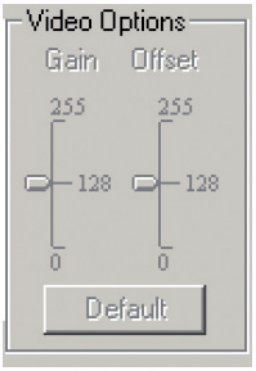


Threshold control elements

Video Options Group

If supported by the camera selected in the Task Setting dialog, the Video Options group will be displayed to allow you to change the image brightness (gain) and black level (offset).

Gain	Increase brightness of the camera image
Offset	Change the black level of the camera image



Video options

Gain and Offset are analog functions done before the video image is digitized. Setting Gain and Offset correctly will result in better images.

4.1.4 Vessel Flow Characteristics Recording Task

The Vessel Flow Characteristics Recording Task provides the ability to display one or more of the following vessel-centric traces:

- Mean Pressure
- Vascular Resistance
- Shear Stress
- Reynolds Number

The Vessel Flow Characteristics Recording Task uses information entered in the following places:

- Task settings - Settings that apply to all experiments using this task, entered in the Task Manager dialog.
- Experiment settings - Settings for this task that apply to all epochs in an experiment, entered in the Parameters dialog.
- Epoch settings - Settings for this task for a specific epoch in an experiment, entered in the Parameters dialog.

Task Options

The vessel flow characteristics recording task experiment settings allow you to select which raw traces are collected and configure which optional calculated traces will be shown.

Task Output

The vessel flow characteristics recording task produces the following traces in DMT Vessel Acquisition Suite, where "*Name*" is the description entered in the Task Settings dialog. The actual traces that you will see depend on options selected in the Task Settings and Experiment Settings.

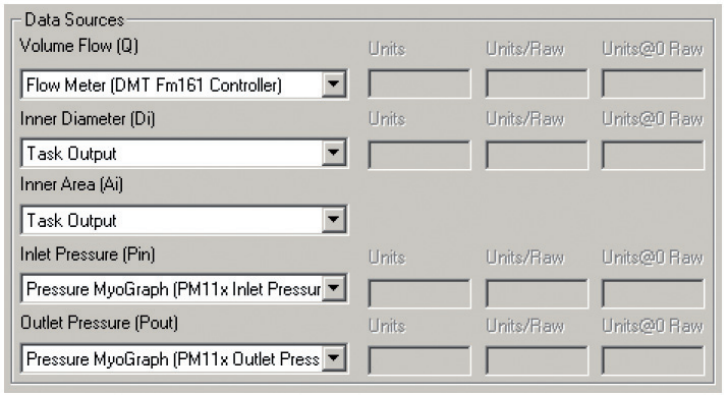
"*Name*-Raw Inputs" traces	Raw data traces collected by Data Sources that are defined using a hardware sensor. **Flow** - flow rate **Diameter** - vessel diameter **Inlet Pressure** - inlet pressure **Outlet Pressure** - outlet pressure
"*Name*-Inputs" traces	"Raw Inputs" trace(s) scaled to calibrated units specified in Data Sources group of Task Settings PLUS area if diameter trace does not have zones **Flow** - flow rate **Diameter** - vessel diameter **Inlet Pressure** - inlet pressure **Outlet Pressure** - outlet pressure **Area** - calculated from "Diameter" task output OR from "Diameter" raw input trace.
"*Name*-Inputs (zones)" traces	Calculated trace when diameter traces can have more than one zone **Area** - calculated from "Diameter" task output
"*Name*-Inputs (iunit)" traces	(hidden by default) All "Inputs" traces converted to intermediate units.
"*Name*-Inputs (iunit, zones)" traces*	(hidden by default) All "Inputs (zones)" traces converted to intermediate units.
"*Name*-Inputs (interpolated iunit)" traces*	(hidden by default) All "Inputs (iunit)" traces interpolated to the same times as the master
"Name-Inputs (interpolated iunit, zones)" traces*	(hidden by default) All "Inputs (iunit, zones)" traces interpolated to the same times as the master
"*Name*-Outputs (iunit)" traces*	(hidden by default) Results of calculations for all traces without zones selected in the Experiment Settings "Traces To Collect" group in intermediate units. **Flow Velocity** - flow rate divided by lumen area **Wall Shear Stress** - calculation of frictional drag exerted on arterial walls during flow **Vascular Resistance** - calculation of force opposing the movement of solution through a vessel **Reynolds Number** - calculation that describes whether the flow is either turbulent or laminar **Mean Pressure** - average inlet and outlet pressure **Pressure Differential** - difference between inlet and outlet pressure.
"*Name*-Outputs (iunit, zones)" traces*	(hidden by default) Results of calculations for all traces with zones selected in the Experiment Settings "Traces To Collect" group in intermediate units **Wall Shear Stress** - calculation of frictional drag exerted on arterial walls during flow **Vascular Resistance** - calculation of force opposing the movement of solution through a vessel **Reynolds Number** - calculation that describes whether the flow is either turbulent or laminar **Reynolds Number** -
"*Name*-Outputs" traces	All "Name-Output (iunit)" traces converted to output units specified in the Task Settings Unit Conversions sub-dialog
"*Name*-Outputs (zones)" traces	All "Name-Output (iunit,zones)" traces converted to output units specified in the Task Settings Unit Conversions sub-dialog

Refer to "Showing and Hiding Trace Bars" in the DMT Vessel Acquisition Suite documentation for details on viewing hidden traces.

Vessel Characteristics

The vessel flow characteristics recording task produces the following traces in DMT Vessel Acquisition Suite, where “Name” is the description entered in the

4.1.4.1 Task Settings

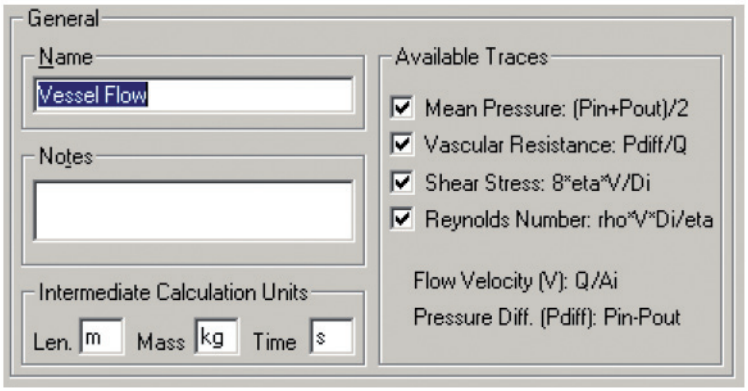


Vessel Flow recording task settings

Clicking the Edit... button in the Task Manager when a Vessel Flow Characteristics Recording Task is highlighted will display the task settings dialog. There are three major sections in the task settings dialog that are detailed below. In addition there is a Unit Conversions sub-dialog accessed from the Units...button.

Each Trace lists the formula used to calculate the value based on the symbols defined in parenthesis after the coorresponding trace, preset or data source name.

General



Vessel Flow General Settings

The general section has the following fields:

Name	Name for this specific instance of the task. Also used as part of the string in the first yellow box (type) in the Trace Viewer for data acquired using this task.
Notes	Enter any notes to yourself about this recording task.
Intermediate Calculation Units	All raw traces must be converted to a common set of intermediate units in order perform the calculations. Specify the units for Length (Len.), Mass and Time.
Available Traces	The first items select which traces will be available and determines which Data Sources will be required: **Mean Pressure** - requires Inlet Pressure and Outlet Pressure data sources **Vascular Resistance** - requires Volume Flow, Inlet Pressure and Outlet Pressure data sources **Shear Stress** - requires Volume Flow, Inner Diameter and Inner Area data sources **Reynolds Number** - requires Volume Flow, Inner Diameter and Inner Area data sources. The last two items indicate which additional available traces are automatically available based traces selected above: **Flow Velocity** - available if Shear Stress or Reynolds Number trace is selected **Pressure Diff** - available if Mean Pressure or Vascular Resistance trace is selected

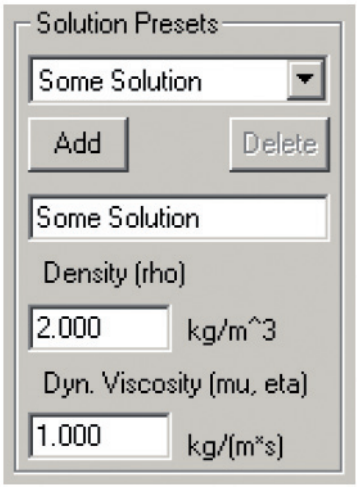
Select intermediate calculation units to be either units that are "natural" for your data and/or provide manageable conversion values in the Unit Conversions dialog.

If you change the name of an existing task all saved user limits and templates will be reset.

Solution Presets

The Presets group allows you to define an arbitrary number of solutions that can be selected in the Experiment Settings to define the density and viscosity parameters required for the flow calculations.

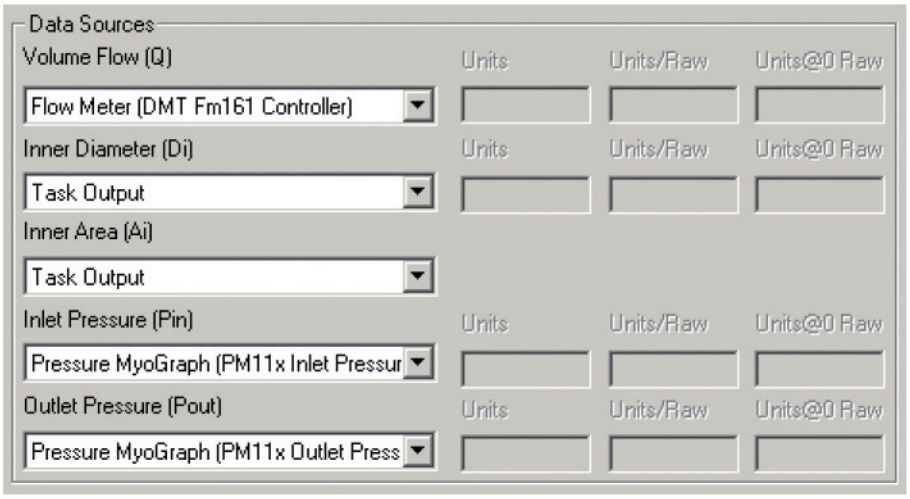
Name (drop down)	The name drop down allows you to select from the list of previously created solution presets. When you select a new value the remaining fields in the Presets group. are loaded with values that were previous entered.
Add	Makes a copy of the current solution which you can then edit using the remaining controls in the Presets group.
Delete	Deletes the current solution and selects the previous one for editing. Disabled if there is only one preset defined.
Name (edit)	Edit the name of the current solution. Changes made here automatically appear in the Name drop-down field as well.
Density	Enter the density for the named solution.
Dyn. Viscosity	Enter the Dynamic Viscosity for the named solution.



Vessel Flow Solution Presets

The units for the solution values are set in the Intermediate Calculation Units group in the General group.

Data Sources



Vessel Flow Solution Presets

The Data Source group allow you to define the source of the data for each calculation parameter.

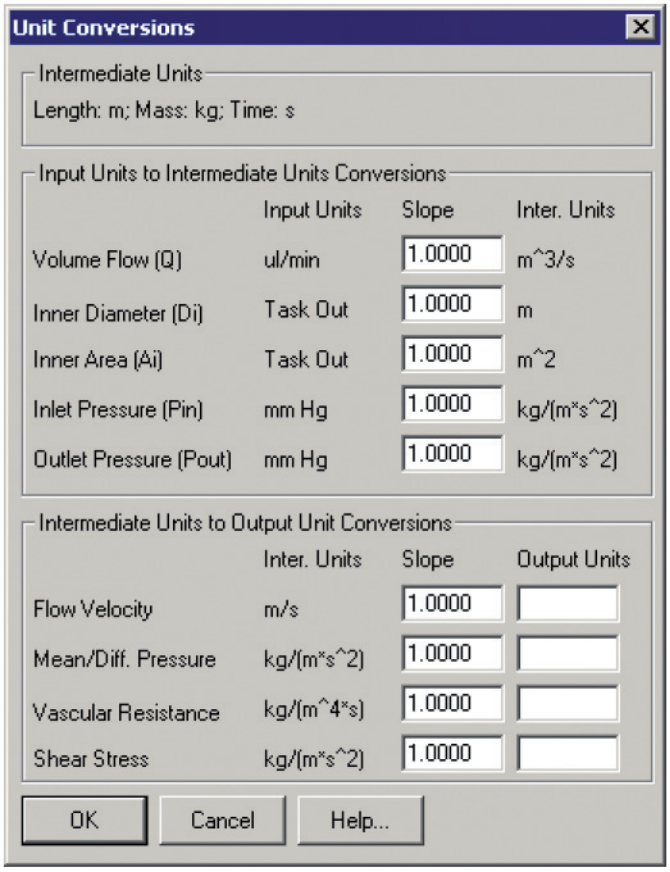
Source The first column lists the possible sources for each of the parameters. The specific parameter name is listed above the source drop-down list. The first choice, “Task Output” allows you to use any trace in any recording task in the current experiment (the specific trace is selected in Experiment Settings) .
For “Inner Area (Ai)” the other choice is “Calculate from diameter”, for all other data sources the remaining choices are a list of all compatible sensors in the current hardware tree.

Units Calibrated units for the selected source, e.g. Temperature, flow, etc... Disabled when the sensor provides this information.

Units/Raw Scale factor to convert raw sensor values (e.g. volts) to calibrated units specified in the Units field. Disabled when sensor provides this information.

Units@0Raw Calibrated units value to return raw sensor value is 0. Disabled when sensor provides this information.

4.1.4.1.1 Unit Conversions



Vessel Flow Solution Presets

The Unit Conversions sub-dialog, accessed by pressing the Units... button in the Task Settings dialog, provides the ability to set the conversion factors used to process the raw sources and provide the results in the desired output units.

Intermediate Units — This section shows the values entered in the main task settings dialog for reference.

Input Units to Intermediate Units Conversions — Specify the conversion factor (slope) need to convert the specified input units to the specified intermediate units (Inter. Units). If the input units are listed as “Task Out” you will need determine the actual input units yourself from the task that you select in the Experiment Settings .

Intermediate Units to Output Unit Conversions — This section allows you to convert the calculation results from intermediate units to any other unit desired. Enter the scale factor (slope) and the name for the Ouptut Units for each output trace.

If you want use the intermediate units as the output units enter a slope of 1 and type the inter. units values into the output units field.

4.1.4.2 Experiment Settings

Selecting the first column of a Vessel Flow Characteristics Recording Task row in the Parameters dialog will display the experiment settings group in the edit area. The following fields can be edited:

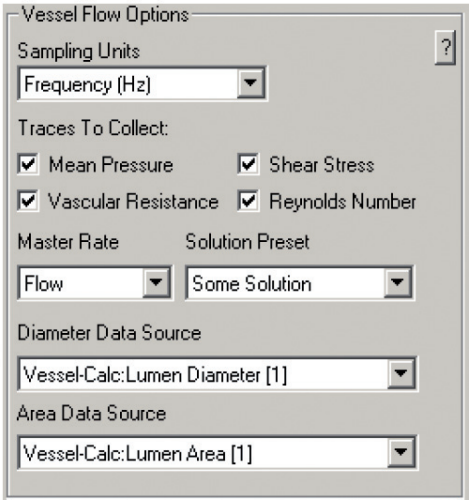
Sampling Units — Chose how you want to enter sampling rates in the Epoch Settings dialog.
Frequency - Enter as Hertz.
Period - Enter as seconds

Traces To Collect — Check any optional traces that you want to collect with this data.

Master Rate — Select what data trace will provide the output times for the calculated data. Choices are **Flow, Diameter, Inlet Pressure** and **Outlet Pressure.**

Solution Preset — Select the solution preset to use from the list defined in the Solution Presets group of the Task Settings dialog.

Task Data Sources — Select the specific task output trace for each "Task Output" data source defined in the Task Settings dialog.



Vessel Flow Recording Task experiment settings edit area

All output traces (eg. "Name-Outputs...") will have the same times (rate) as the data trace selected in "Master Rate."

4.1.4.3 Epoch Settings

Selecting any epoch column of a Vessel Flow Characteristics Recording Task row in the Parameters dialog will display the epoch settings group in the edit area for the selected epoch. There will be a separate group for each Data source and the contents of that group will depend on how it is configured in the Task Settings and Experiment Settings.

The edit area will let you select the following values:

If the data source is a hardware sensor...

Frequency* Sampling frequency. (if “Frequency” selected in the experiment settings column)

Period* Sampling period. (if “Period” selected in the experiment settings column - not pictured)

Average At a given frequency/period there will be a maximum number of points (displayed as the “of n”) that can be collected. Select the number of samples to average into a single raw data point.

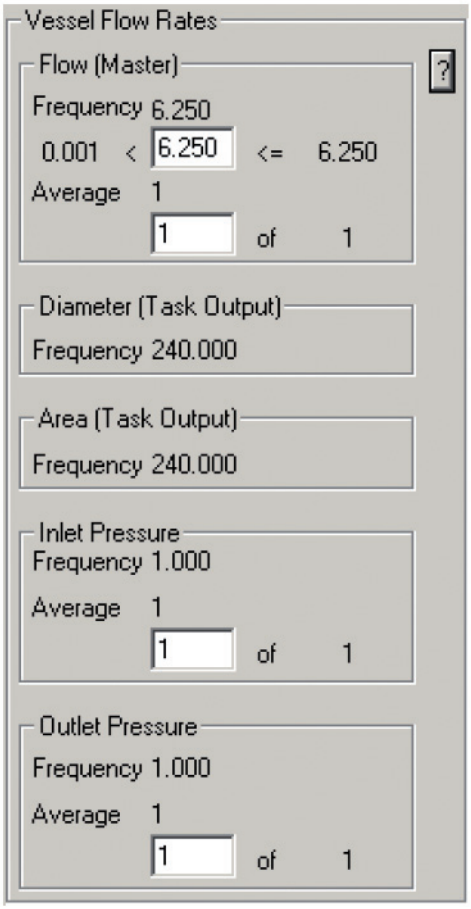
** Only editable on the master data source*

If the data source is a task output...

Frequency* Sampling frequency. (if “Frequency” selected in the experiment settings column).

Period* Sampling period. (if “Period” selected in the experiment settings column - not pictured)

** Only editable on the master data source*



Vessel dimension recording task gobal settings edit area

The minimum and maximum values for frequency or period are determined by the hardware capabilities and settings.

Frequency and period values entered are rounded to the nearest multiple of the pacer frequency and displayed above the input box. When focus is moved away from the control this value is moved into the input control.

4.2 Output/Control Tasks

Output Tasks are tasks that output data to one or more devices. Output tasks can output:

Trace data Any trace data that can be displayed in an DMT Vessel Acquisition Suite trace viewer can also be output to any analog output device. An example usage would be to output the cell length trace to a chart recorder.

Signal Generator A task can output a different value to a device at the start of each epoch. An example usage would be to change the temperature of a solution between each epoch.

4.2.1 Trace Output Task

The trace output task scales values from the selected Trace Data Source and outputs them to the Data Receiving Device. The source can be any trace from the current experiment or any analog sensor in the current hardware tree. The range of source values that you specify in the Experiment settings are output over the range of the Data Receiving Device.

New output values are calculated at the pacing rate set in the Hardware Manager Timer Configuration Dialog. The output is delayed by an amount specified in the Experiment Parameters Global Settings DA Delay to allow data from sensors with different processing times to be synchronized.

A trace output task uses data entered in three separate places:

- Task settings - Settings that apply to all experiments using this task. Entered in the Task Manager dialog.
- Experiment settings - Settings that apply to all tasks and epochs in an experiment. Entered in the Experiment Global Settings section of the Parameters dialog.
- Epoch settings - Settings for this task that apply to all epochs in an experiment. Entered in the Parameters dialog.

4.2.1.1 Task Settings

Clicking the Edit... button in the Task Manager when a Trace Output Task is highlighted will display the task settings dialog. It has the following fields:

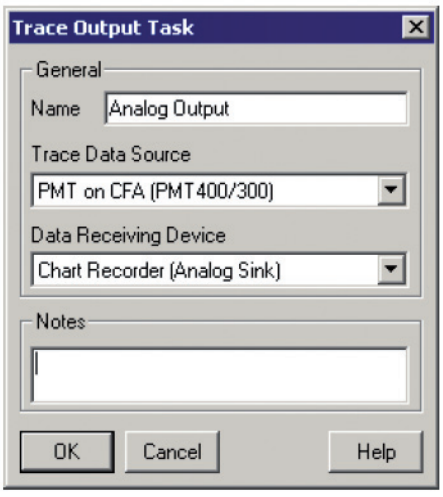
Name Name this task.

Trace Data Source Select the source for the data to be output.
Available choices are:

Trace Output - A single choice that allows you to choose any trace in the current experiment. The specific trace is selected is selected in Experiment Settings column of the Parameters Dialog .
Analog sensors - All analog sensors in the hardware tree are individually listed.

Data Receiving Device List of all devices in the Hardware Tree that can receive (and then output) analog data.

Notes Enter any notes to yourself about this recording task.



Trace Output Task dialog

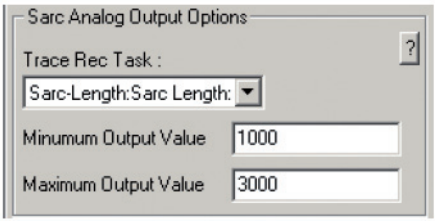
4.2.1.2 Experiment Settings

Selecting the first column of a trace output task row in the Parameters dialog will display the experiment settings group in the edit area. The following values can be edited:

Trace Rec Task If "Trace Output" was selected as the Trace Data Source in the Task Settings dialog, this drop down list will show all combinations of trace/channel/zones from all available tasks in the experiment. If a hardware source was selected, this box will be grayed out.

Minimum Output Value Device or trace value that will result in lowest output voltage.

Maximum Output Value Device or trace value that will result in highest output voltage



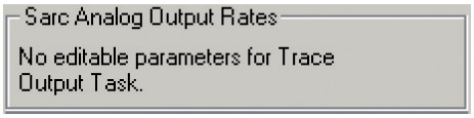
Trace Output Task experiment settings

Adding one or more Trace Output tasks will enable the DA Delay option in the Experiment Global Settings area of the Parameters dialog

The trace output task uses the full voltage range of the data receiving device or, if supported, the "input range" set in the specification dialog. The lowest voltage will be output for the minimum value or below, the highest voltage will be output for the maximum value or above and the voltage will be linearly scaled between lowest and highest voltage if the value is between the minimum and maximum.

4.2.1.3 Epoch Settings

There are no editable parameters for the Trace Out Task.



Trace output task epoch settings

4.2.2 Signal Generator Task

The Signal Generator Task provides the ability to output separate voltages for each epoch in an experiment and to optionally provide manual control using the Manual Control Tool Bar.

The signal generator task is configured in three separate places:

- Task settings - Settings that apply to all experiments using this task. Entered in the Task Manager dialog.
- Experiment settings - Settings that apply to all tasks and epochs in an experiment. Entered in the Experiment Global Settings section of the Parameters dialog.
- Epoch settings - Settings for this task that apply to all epochs in an experiment. Entered in the Parameters dialog.

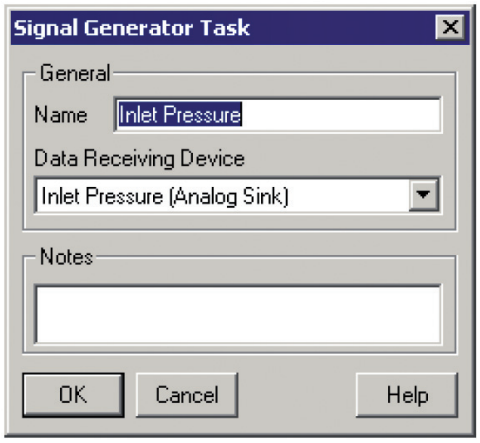
4.2.2.1 Task Settings

Clicking the Edit... button in the Task Manager when a Signal Generator Task is highlighted will display the task settings dialog. It has the following fields:

Name Name for this specific instance of the task. Also used as the title for the Manual Control Tool Bar.

Data Receiving Device Select the device that will receive the output from the signal generator.

Notes Enter any notes to yourself about this recording task.

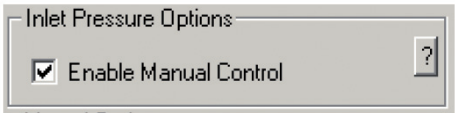


Signal Generator Parameters

4.2.2.2 Experiment Settings

Selecting the first column of a Signal Generator Task row in the Parameters dialog will display the experiment settings group in the edit area. The following values can be edited:

Enable Manual Control If checked a Signal Generator Manual Control will be added to Manual Control Tool Bar .

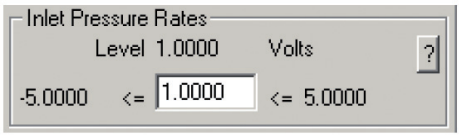


Signal Generator experiment settings

4.2.2.3 Epoch Settings

Selecting any epoch column of a Signal Generator Task row in the Parameters dialog will display the epoch settings group in the edit area for the selected epoch. The edit area will let you select the following values:

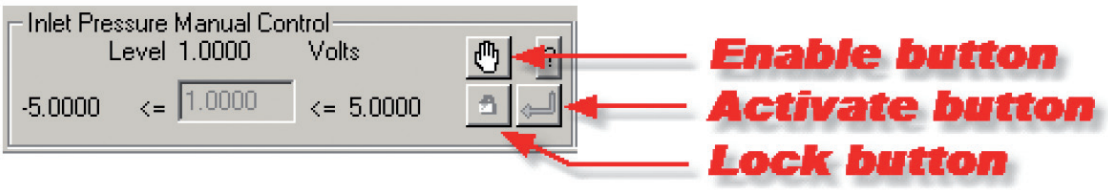
Level Voltage level that is output to the Data Receiving Device during this epoch.



Signal Generator Epoch Settings

Values set by an epoch may be over-ridden by the Manual Controls if they have been enabled in the Experiment Settings.

4.2.2.4 Manual Control



Signal Generator Manual Control

The Signal Generator task has a manual control group that appears in the Manual Control Tool Bar displayed in the Experiment Tool Bar area at the bottom of the DMT Vessel Acquisition Suite window. It allows you to see and override the setting set by acquisition tasks .

The following controls in the top right section of the tool bar allows can to enter new “set” values, send them to the hardware and control how the long the stay activated.

Level — Enter new value for the output voltage within the specified range that will be set when Activate button is clicked.

Enable button — When pressed enables editing and activating of “new” set values. When released acquisition task(s) control of the device, if any, will be enabled.

Lock button — When pressed previously activated values will remain in effect as long as manual override is enabled. When released (as shown) acquisition task(s) control of the device, if any, will return at the end of the current epoch.

Activate button — When clicked all “new” values will override any values set by acqusition task(s), if any. Values will not return to acquisition task control until then end of the current epoch or until manual override is disabled.

When manual override is enabled and you activate new settings the normal output by the signal generator task is disabled until the end of the epoch or, if the Lock button is pressed, until manual override is disabled.

4.3 Task Primitives

The following primitives are tools that are common to more than one task.

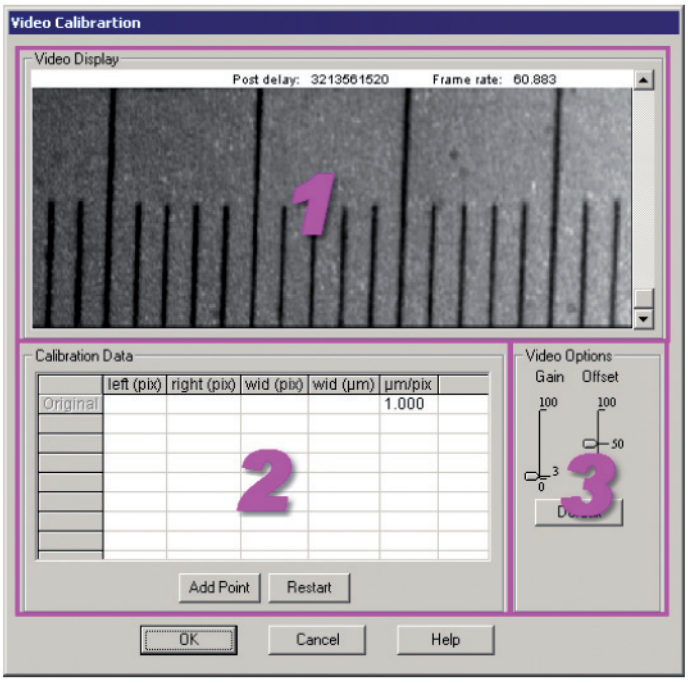
4.3.1 Video Calibration Dialog

The Video Calibration dialog is used to collect and calculate the scaling factor used to convert pixel dimensions into physical units from within the Task Settings dialog of any acquisition task that measures objects seen by a camera. The resulting value is automatically entered into the Units/Pixel field of the recording task when you click OK. This is done by placing an object with known physical dimensions on the microscope stage then using the mouse to indicate where on the video image the object is located.

The Video Calibration dialog has three main areas:

1. Video display and measurement area - This area displays the live video from the camera.
2. Calibration Data - The original scaling value, all added calibration points and the new scaling value is displayed here. These values are continuously updated to reflect the current video image and position of the calibration markers.
3. Video Options - Provides control of input gain and offset, If supported by the current sensor.

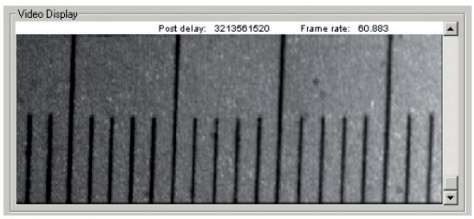
NOTE - you may resize the Video Display dialog by clicking and dragging the edge and corner of the dialog box.



Video Calibration dialog

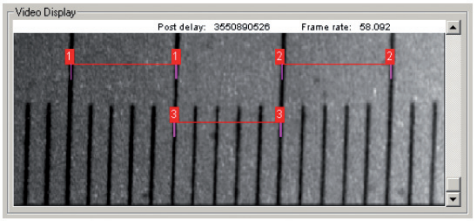
Video Display Area

When you first open the Video Calibration dialog you will see live video displayed from the sensor currently selected in the recording task that you were editing when you pressed “Collect...” to start the dialog.



Video Calibration Initial Video Display area

When you add a new calibration point a calibration ruler control will be displayed in the Video Display area. You use this control to indicate the position of an object that is the physical distance specified when you added the point.



Video Calibration Video Display area with 3 points

Calibration Data Area

The Calibration Data area of the Video Display dialog displays all of the information used to calculate the new scaling value. The first row shows you the original value for the scaling factor and is not used in the new calculation. The next rows, if any, show the data for each calibration point that you add. If you have one or more calibration points the last row will show you the new value which is the average of all calibration points above.

The values in the columns for the calibration point rows allow you to see the intermediate values and calculations so you can doublecheck that everything is reasonable.. There are five columns:

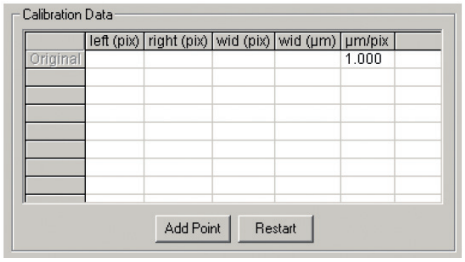
left (pix) Location of the left position of the calibration ruler control in pixels.

right(pix) Location of the right edge of the calibration ruler control in pixels.

wid(pix) Width in pixels, e.g. right(pix) - left(pix).

wid(µm) Width converted to microns using width entered when calibration point was added.

µm/pix The resulting scale factor for this calibration point. e.g. wid(µm)/wid(pix).

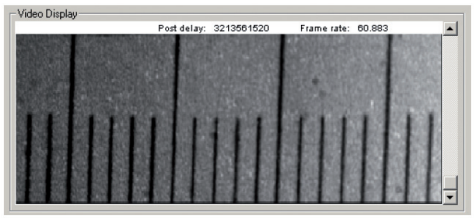


Video Calibration Data area

4.3.1.1 Using The Video Calibration Dialog

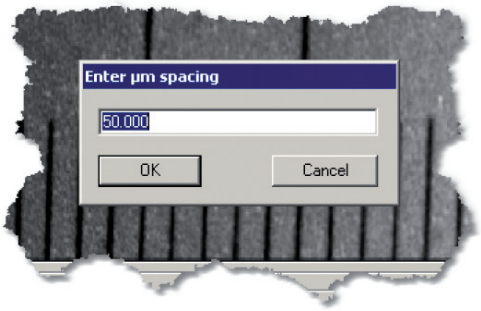
1. Place an object with known dimensions on the microscope stage. IonOptix provides a 10µm stage micrometer with each system for this purpose. The stage micrometer is a microscope-scale ruler mounted on a standard cover slip that has etched marks at precise 10µm increments with taller tics ever 50µm.

2. Position the slide and/or adjust the camera so that the ruler is parallel to the camera as shown. Make sure that the rules are in focus as much as possible and that there is reasonable contrast between the lines and the background.



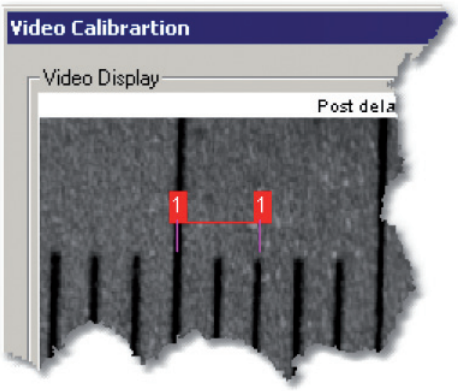
Video Calibration stage micrometer position

3. To add a new calibration measurement click the Add point button. A popup message box (shown at right) will prompt you to enter the length that you want to measure. The units, µm in this example, are taken from current value of the “units” field in the recording task that you are editing. The value that you enter here will be physical length of the calibration ruler control that you will position on the video screen in the next steps.



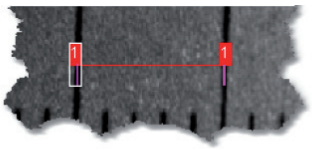
Video Calibration Enter unit spacing

4. After you click the OK button a new calibration ruler control will be added in the Video Display Area. The control can be moved and resized by dragging different areas of the control.

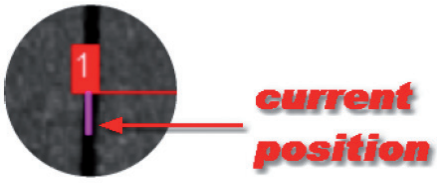


Video Calibration calibration ruler

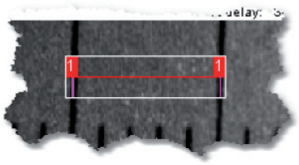
5. To stretch or shrink the length click and drag the red box at either end to the left or right. When you click on the end a white box will appear to confirm that you have clicked in the correct location.



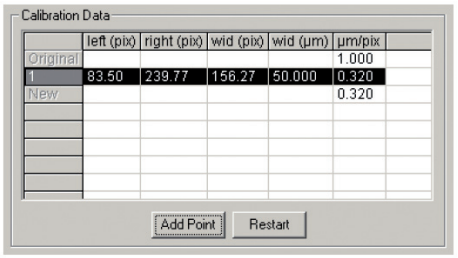
6. The exact position of the edges are calculated by scanning the video image 'under' the box. The resulting position is displayed as a magenta line below the box. When positioning the left/right ends of the calibration ruler control move red box so that it is over the image of the line on the stage micrometer. If positioned properly the current position (magenta) line should be near the middle of the red box as shown here.



7. To move the ruler horizontally or vertically without changing the length click on the line between the boxes then drag the ruler to a new position. When you click on the line to move a white box will be drawn around the entire control as shown.



8. As you move the calibration ruler control the values in the Calibration data table will change in the highlighted row and the resulting new scaling factor will be displayed in the last row.



You may added as many calibration points as you think are needed. When you are done press the OK button and the new calibration value (from the last row) will be entered into the Record task settings.

Chapter 5 - Acquisition Devices

In the context of the Hardware Manager, a device is software which provides support for a specific physical device. The Hardware Tree uses these devices to model the physical setup. Devices can be either root devices or attached devices. Root devices are interface cards plugged to a standard computer bus inside the computer or external port (see below). Attached devices are devices that are attached to root devices or other attached devices.

Eventually you attach a device that provides connections to the acquisition tasks that are used in an experiment. These connections between devices and acquisition tasks are called “task connections”. When you edit the settings of a given task, such as the Task Settings dialog of the Trace Recording Task , you will pick what you are recording by selecting a sensor from the list of all available analog trace task connections in the hardware tree.

In addition to providing a representation of the physical device interconnections, each device may have a specification and/or test function that can be accessed in the Hardware Manager dialog. The specification function provides the ability to indicate to DMT Vessel Acquisition Suite how the physical device is configured. If the device has options that can be controlled via computer, the specification function may also allow them to be set. The test function provides the ability to operate the physical devices from the Hardware Manager dialog. This is normally used to test that the device is able to control and/or read from the physical device.

Refer to specific device documentation for specific details on functions and connections provided by each device.

External Ports

Some devices attach to “standard” computer external ports. The device documentation will refer to the following external port types:

Serial Ports	Legacy 9-pin serial-ports for slow speed communications with simple cables.
Parallel Ports	Legacy 25-pin parallel ports for ‘faster’ communications.
USB	The original USB port (usually called USB 1.0 or USB 1.1) was created to replace legacy ports. It provided faster speeds as well as plug-and-play configuration and was originally designed for printers, keyboards etc...
USB 2.0	Second generation of USB that provides support for higher speed devices such as hard drives and cameras.

If you are purchasing or upgrading a computer, you must make sure that the new computer has the type of ports needed by your devices.

DMT Vessel Acquisition Suite supports standard USB-to-Serial adapters that allow you to connect a serial device to a USB 1.1 or 2.0 port.

If your computer has extra slots but is missing a specific port type, you MAY be able to purchase an interface card (ie a PCI to USB 2.0) card.

5.1 Danish Myo Techology Devices

The Danish Myo Technology devices provide support for equipment manufactured by Danish Myo Technology A/S.

5.1.1 DMT Pressure Myograph: PM11X

The DMT Pressure Myograph device provides support for pressure myograph systems from Danish Myo Technologies. This device provides support for the temperature, pressure, force and optional pH functions of the system.

DMT Myograph controller

Device Name

The DMT Pressure Myograph device appears as “DMT PM” in the Hardware Manager dialog’s Hardware Tree section. The name can be changed in the Specification Dialog .

Requirements

The DMT Pressure Myograph device requires an available serial port in the hardware tree.

DMT Pressure Myograph

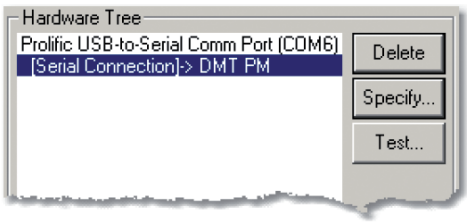
5.1.1.1 Device Connections

Required connections

The DMT Pressure Myograph device must be connected to a Serial Port device in the Hardware Tree.

Provided Connections

The DMT Pressure Myograph device does not provide any connections for other devices.



DMT Pressure Myograph Connections

5.1.1.2 Task Connections

The DMT Pressure Myograph device provides both sensors and inputs that can be selected in acquisition tasks. In the following list “Name” is the description entered in the Specification dialog.

Device Sensors

The following sensors can be selected in any acquisition task that monitors or records analog values.

“Name (temperature)”	Current temperature (°C)
“Name (inlet pressure)”	Current inlet pressure (mm Hg)
“Name (outlet pressure)”	Current outlet pressure (mm Hg)
“Name (force)”	Current force (mN)
“Name (pH)”	Current pH (if “Has pH probe connection” is selected in the Specification dialog.)
“Name (target temperature)”	Target temperature (°C)
“Name (target inlet pressure)”	Target inlet pressure (°C)
“Name (target outlet pressure)”	Target outlet pressure (°C)

Device Inputs

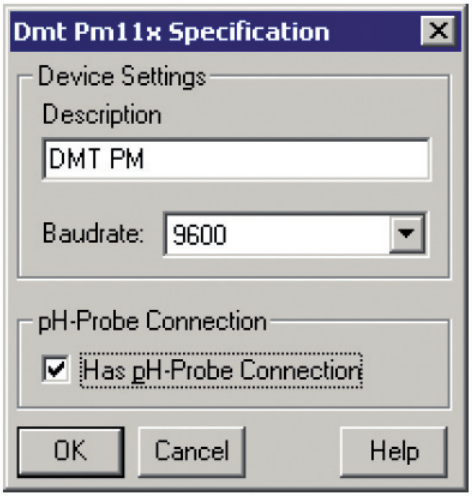
The following inputs can be selected in acquisition tasks that output analog values:

"Name (temperature)"	Set target temperature (°C)
"Name (inlet pressure)"	Set target inlet pressure (°C)
"Name (outlet pressure)"	Set target outlet pressure (°C)

5.1.1.3 Specification Dialog

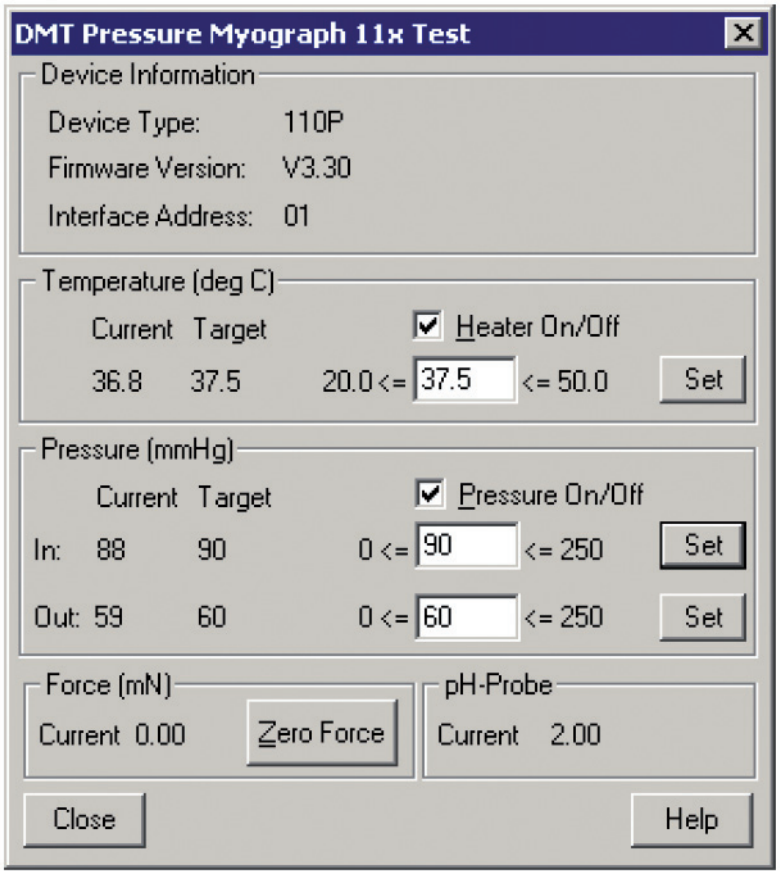
The DMT Pm11x Specification dialog provides the mechanism to set basic information about the connected device.

Description	Enter "friendly" name used to identify this specific pressure myograph.
Baudrate	Select baudrate used to communicate with pressure myograph.
Has pH-Probe Connection	Enable display of readings from attached pH probe.



DMT Pressure Myograph Specification Dialog

5.1.1.4 Test Dialog



Pressure Myograph Test Dialog

The DMT Pm11x Test dialog provides real-time display and control of the attached pressure myograph device.

Device Information: Display information about the attached device.

Temperature (deg C): Display current temperature and set temperature control options
Current - actual temperature
Target - the current target temperature
New - Enter new target temperature between displayed range then press Set button to send to device.
Control Temperature - Check to enable heater control

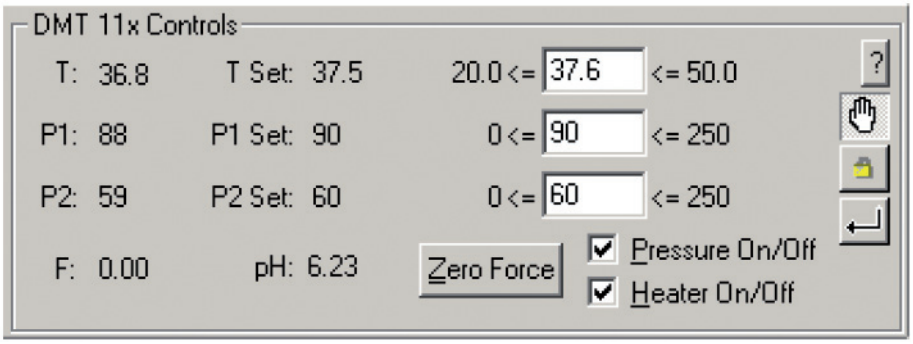
Pressure (mmHg): Display current inlet and output pressure and set target pressure options.
Current - actual pressure
Target - the current target pressure
New - Enter new target pressure with indicated range then press the Set button to make send to device.
Control Temperature - Check to enable pressure control.

Force (mN): Display current force and zero control.
Current - actual force
Zero Force - reset current force as zero force.

pH-Probe: Display current pH reading.
Current - Actual pH reading or “No pH -meter attached” if enabled in Specification dialog

The initial values in the Test dialog are read from the Pressure MyoGraph device when the Test dialog is opened. After the dialog is opened changes made using the Myograph controller keypad will NOT be reflected in the Test dialog and will be replaced if changed using the Set button.

5.1.1.5 Manual Control



DMT Pressure Myograph Manual Control

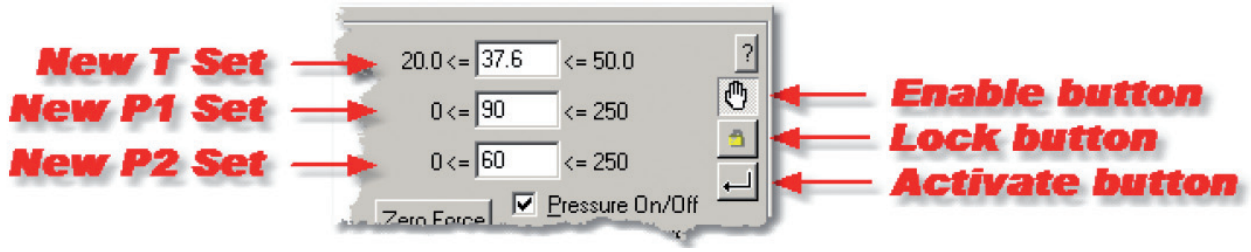
The DMT Pressure Myograph device has a manual control group that appears in the Manual Control Tool Bar displayed in the in the Experiment Tool Bar area at the bottom of the DMT Vessel Acquisition Suite window. It allows you to see the current hardware settings and to override settings set by acquisition tasks. The manual control group appears whenever any DMT Pressure Myograph Task Connection is used in any acquisition task that is included in the current experiment.

Display Values

The following values are displayed in the left side of the tool bar:

"T"	Current temperature (°C)
"P1"	Current pressure 1 (mm Hg)
"P2"	Current pressure 2 (mm Hg)
"F"	Current force (mN)
"pH"	Current pH (if "Has pH probe connection" is selected in the Specification dialog.)
"T Set"	Current target temperature (°C)
"P1 Set"	Current target pressure 1 (mm Hg)
"P2 Set"	Current target pressure 2 (mm Hg)

Manual Override



DMT Pressure Myograph Manual Toolbar Group - manual override

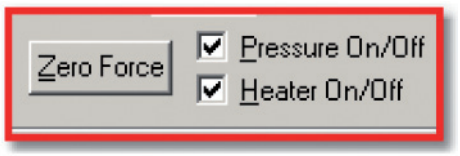
The top right section of the tool bar allows you to enter new "set" values, send them to the hardware and control how the long the stay activated.

New T Set	Enter new value for "T Set" that will be set when Activate button is clicked
New P1 Set	Enter new value for "P1 Set" that will be set when Activate button is clicked
New P2 Set	Enter new value for "P2 Set" that will be set when Activate buttonis clicked
Enable button	When pressed (as shown) enables editing and activating of "new" set values. When released acquisition task(s) control of the device, if any, will be enabled.
Lock button	When pressed previously activated values will remain in effect as long as manual override is enabled. When released (as shown) acquisition task(s) control of the device, if any, will return at the end of the current epoch.
Activate button	When clicked all "new" values will override any values set by acqusition task(s), if any. Values will not return to acquisition task control until then end of the current epoch or until manual override is disabled.

When manual override is enabled and you activate new settings the normal control of the DMT device by any acquisition tasks is disabled until the end of the epoch or, if the Lock button is pressed, until manual override is disabled.

Manual Settings

The remaining controls in the toolbar give you manual control of parameters that can only be set here or with the front panel controls on the device. The Enable, Lock and Activate buttons operate differently for these controls, see below.



DMT Pressure Myograph Manual Toolbar Group - manual settings

Pressure On/Off Automatically changes to reflect current hardware setting. When the Enable button is pressed you can turn on pressure control by checking the box and turn off by unchecking the box.

Heater On/Off Automatically changes to reflect current hardware setting. When the Enable button is pressed you can turn on heater control by checking the box and turn off by unchecking the box.

Zero Force When the Enable button is pressed clicking the button will make the current force reading zero.

5.1.2 DMT FlowMeter - 161FM

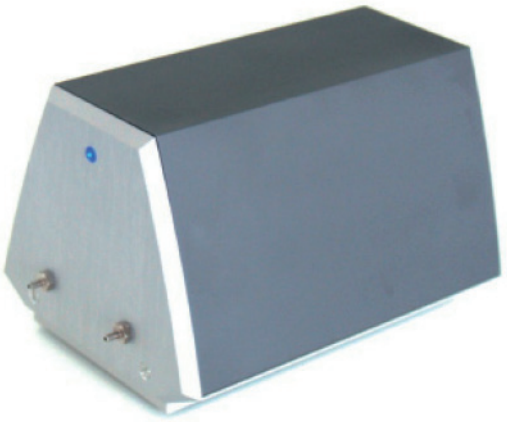
The DMT FlowMeter device allows flow readings.

Device Name

The DMT FlowMeter device appears as “Flow Meter” in the Hardware Manager dialog’s Hardware Tree section. The name can be changed in the Specification Dialog.

Requirements

The DMT Flow Meter device requires an available serial port port in the hardware tree.



DMT FlowMeter - 161FM

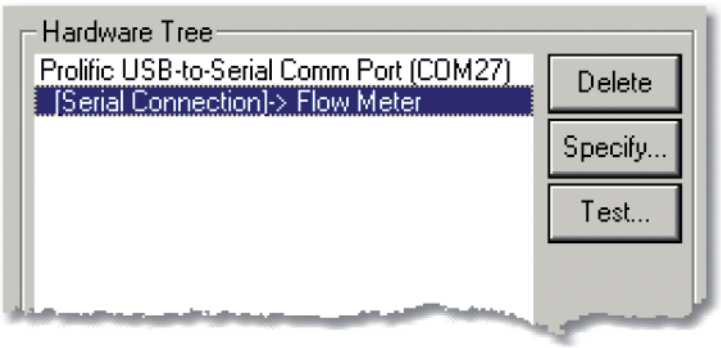
5.1.2.1 Device Connections

Required connections

The “Flow Meter” device must be connected to a “Serial Connection” port.

Provided Connections

The DMT FlowMeter device does not provide any connections for other devices.



DMT Flow Meter Device Connections

5.1.2.2 Task Connections

The DMT FlowMeter device provides an analog sensor that can be selected as an input in acquisition tasks such as the Trace Recording Task. In the following list “Name” is the description entered in the Specification dialog.

Device Sensor

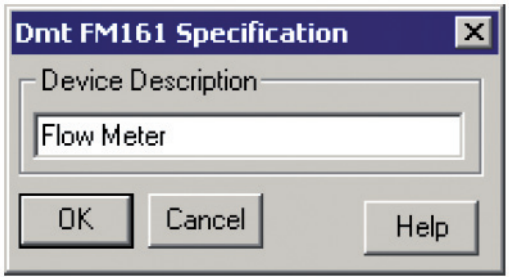
The following sensor can be selected in any acquisition task that monitors or records analog values.

“Name (DMT Fm161 Controller)” Current flow reading from device

Device Inputs

The DMT FlowMeter device does not provide any device inputs.

5.1.2.3 Specification Dialog

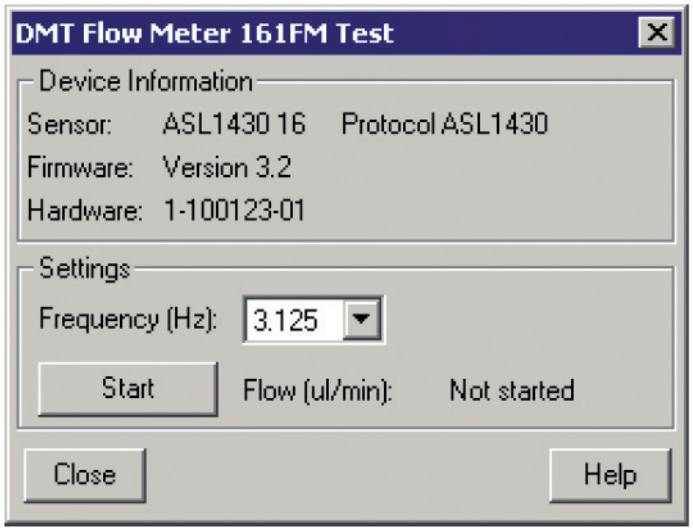


DMT Flow Meter Specification Dialog

The DMT FlowMeter Specification dialog provides the mechanism to set basic information about the connected device.

Description Enter “friendly” name used to identify this specific flow meter.

5.1.2.4 Test Dialog



DMT Flow Meter Test Dialog

The DMT FlowMeter Test dialog provides real-time display and of data from the attached flow meter device.

Device Information: Display information about the attached device.

Frequency (Hz): Select the sampling frequency to use when the Start button is pressed. This control is disabled unless update is stopped.

Start: Pressing the Start button starts real-time update of the Flow (ul/min) value. Once started the Start button changes to “Stop”.

Stop: Pressing the Stop button stops real-time update of the Flow (ul/min) value. Once stopped the Stop button changes to “Start”.

5.1.2.5 Global Sensor Settings

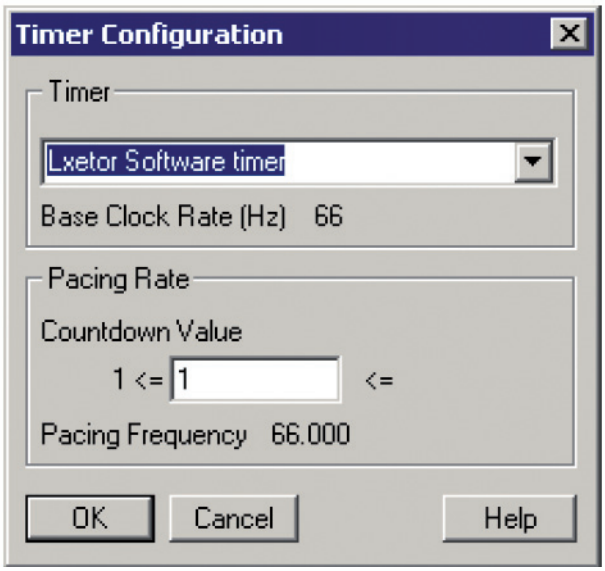
Global Sensor Settings

When the current experiment includes one or more tasks that use the DMT FlowMeter device, a Flow Meter Control group will be added to the Global Sensor Settings area of the Parameters dialog. This control allows you to set the base acquisition rate that will be used when reading flow data from the device.

5.2 Lxetor Software Timer

The Lxetor Software Timer is part of the Hardware manager and implemented using resources that are builtin to the computer. It is a Timer of “last resort” and should not generally be used.

5.2.1 Timer Settings



Lextor Timer Dialog

If you select the Lxetor Software Timer as the system timer in the Hardware Manager Configure Timers Dialog you will be able to adjust the pacing frequency by changing the Countdown Value. As the Base Clock Rate is very slow you will probably always use a Countdown Value of one.

Chapter 6 - Acquisition program/data files

Acquisition support is delivered as a collection of files that are installed in the DMT Vessel Acquisition Suite program directory. In addition, the acquisition module writes the information that you enter into a series of configuration files that are also stored in the DMT Vessel Acquisition Suite program directory.

Program Files

High-level acquisition support is provide by the following files located in the DMT Vessel Acquisition Suite program directory:

IAB_D4.DLL	High-level acquisition support
IAB_KW.SYS	Low-level kernel mode acquisition support
HWMGR_D4MT.DLL	Hardware manager

The software required for each device are provided in additional files. Some standard devices are distributed as with the acquisition module (that is they are standard) while others, such as Edge Detection, are sold separately. The acqusition module scans the DMT Vessel Acquisition Suite program directory for these files:

***.IHC**	Tree component routines. For each .IHC file there will be a corresponding.SYS file.
***.RSS**	Task routines. For each .RSS file there will be a corresponding .SYS file.

Configuration Files Created

The acquisition module stores the data you enter in the following files located in the DMT Vessel Acquisition Suite program directory:

IHWCFG.XML	Hardware manager configuration data
IAB_D4.EST	Task and experiment definitions
IAB_D4.GST	Task control options entered via the tool bars

To copy your hardware, task and experiments settings between installations of DMT Vessel Acquisition Suite copy all three files.

If you delete IHWCFG.XML the other files will be unusable.

Notes

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